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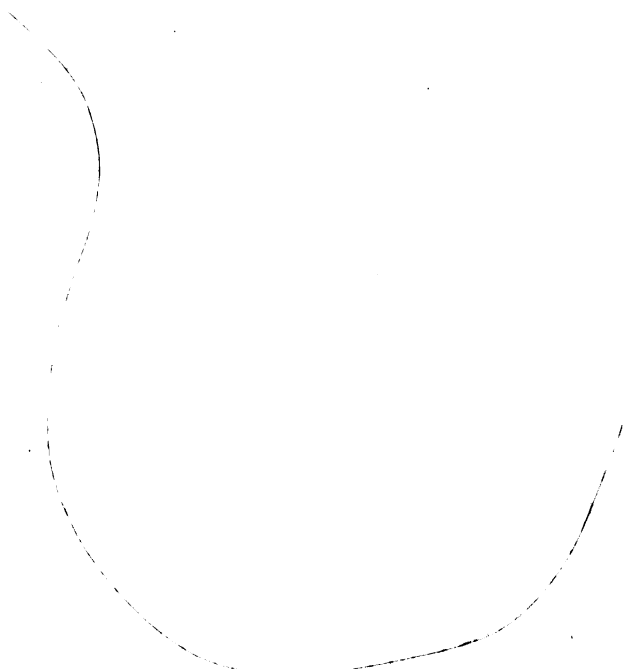
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# ARMY MEDICAL DEPARTMENT

## REPORT

FOR THE YEAR 1877.

VOLUME XIX.

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Presented to both Houses of Parliament by Command of Her Majesty.

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*2nd of Dec 4/8, 1879*



TO THE RIGHT HONOURABLE

THE SECRETARY OF STATE FOR WAR.

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SIR,

IN accordance with instructions laid down for the conduct of business by the Director-General and Heads of Branches of the Army Medical Department, I have the honour to submit the accompanying Report on the Health of the Army in 1877, and on various matters connected with the duties of the Officers of the Department.

The Statistical, Sanitary, and Medical Reports have been drawn up by the Officers in charge of the respective Branches.

I have the honour to be,

SIR,

Your most obedient

Humble Servant,

W. M. MUIR,

*Director-General.*

ARMY MEDICAL DEPARTMENT,  
1879.





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# ARMY MEDICAL DEPARTMENT REPORT FOR 1877.

## STATISTICAL REPORT.

THE average annual strength of the troops serving at home and abroad in 1877, as computed from the returns received by the Army Medical Department, was 174,884 non-commissioned officers and men (exclusive of the Royal Malta Fencible Artillery, the 1st and 2nd West India Regiments, and the Gun Lascars at Ceylon, and at Hong Kong, Corps which are not recruited at home); the admissions into hospital in this force were 165,371, and the deaths 1,723. The rates represented by these numbers are for admissions into hospital 946, and for deaths 9·55 per 1,000 of the average annual strength, the latter being calculated on a strength of 180,351, which includes detached men.

The statistics of some of the most important of the results of sickness, in every Command in which the troops were stationed, are exhibited in the following Table:—

1877.

White Troops.	Average Annual Strength.	Admitted into Hospital.	Died.	Sent Home as Invalids.	Discharged as Invalids.	Constantly non-effective from Sickness, exclusive of those on board Ship.
<b>Troops at Home and Abroad</b>	<b>174,884</b>	<b>165,371</b>	<b>1,723</b>	<b>2,914</b>	<b>4,095</b>	<b>7,746·68</b>
United Kingdom	92,143	74,304	703	—	2,906	3,694·00
Gibraltar	4,677	3,102	38	97	59	185·00
Malta	5,556	4,983	46	105	79	255·00
Dominion of Canada	1,705	951	10	25	17	52·74
Bermuda	1,874	1,179	9	37	27	62·19
West Indies	1,133	1,108	18	42	19	57·00
Cape of Good Hope and St. Helena	3,738	3,116	32	69	45	175·00
Mauritius	429	998	10	12	3	30·08
Ceylon	1,077	1,055	19	16	10	55·23
China and Straits Settlements	2,068	2,037	29	78	37	88·81
Fiji	48	29	0	8	0	1·63
India	57,821	71,285	795	2,425	893	3,090·00
On board Ship	2,615	1,224	14	—	—	—

*Troops at  
Home and  
Abroad.*

1877.—Annual Ratio per 1,000 of Mean Strength.						Average sick-time to each Man.	Average duration of each case of Sickness.
White Troops.	Admitted into Hospital.	Died.	Sent Home as Invalids.	Discharged as Invalids.	Constantly non-effective from Sickness.		
Troops at Home and Abroad	*	†	‡	§		Days.	Days.
	945.6	9.55	36.37	22.71	44.97	16.41	17.23
United Kingdom -	806.4	7.20	—	29.77	40.09	14.63	18.15
Gibraltar -	663.3	8.13	20.74	12.61	39.55	14.44	21.77
Malta -	896.9	8.28	18.90	14.22	45.90	16.75	18.68
Dominion of Canada -	557.8	5.87	14.54	9.97	30.93	11.29	20.24
Bermuda -	629.1	4.79	19.74	14.41	33.19	12.11	19.34
West Indies -	977.9	15.88	37.07	16.77	50.43	18.82	18.41
Cape of Good Hope and St. Helena -	833.6	8.56	18.46	12.04	46.82	17.09	20.50
Mauritius -	2326.3	23.31	27.97	6.99	70.12	25.60	11.00
Ceylon -	979.6	17.64	14.84	9.29	51.28	18.72	19.11
China and Straits Settlements -	985.0	14.02	37.72	17.89	42.94	15.63	15.91
Fiji -	604.2	—	166.70	—	33.96	—	—
India -	1232.9	13.75	41.94	15.44	53.44	19.51	15.82
On board Ship -	468.1	5.35	—	—	—	—	—

\* Calculated on strength, excluding men detached.

† and § Calculated on strength, including men detached.

‡ Calculated on strength, excluding United Kingdom, and sick on board ship.

|| Calculations exclude men detached and sick on board ship.

1867 to 1876.

Station.	Aggregate strength for 10 years.	Admission into Hospital.	Deaths.	Men sent to England as Invalids.	Discharged the Service as Invalids.	Average constantly sick.
Troops at Home and Abroad	1,679,414	1,712,219	23,369	31,052	35,934	75,079
United Kingdom	837,334	686,811	7,923	—	22,951	33,375
Gibraltar	45,131	29,880	303	1,169	726	1,520
Malta	48,037	38,713	589	1,257	810	1,949
Dominion of Canada	52,770	33,787	477	921	717	1,594
Bermuda	17,997	12,334	240	408	244	596
West Indies	13,398	12,279	189	364	171	549
Cape of Good Hope and St. Helena	31,390	31,750	330	774	542	1,522
Mauritius	6,524	11,741	146	297	86	385
Ceylon	9,606	9,927	155	365	161	481
China and Straits Settlements	14,942	19,998	229	648	315	760
India	574,752	810,040	12,559	24,849	9,211	32,348
On board Ship	27,533	14,959	229	—	—	—

1867 to 1876.

*Troops at  
Home and  
Abroad.*

Ratio per 1,000 of Strength.						Average sick-time to each Soldier.	Average duration of each case of Sickness.
	Admitted into Hospital.	Died.	Sent Home as Invalids.	Discharged as Invalids.	Constantly non-effective from Sickness.		
<b>Troops at Home and Abroad</b>	<b>1019·5</b>	<b>13·91</b>	<b>36·88*</b>	<b>21·40</b>	<b>44·71</b>	<b>Days. 16·32</b>	<b>Days. 16·01</b>
United Kingdom	820·2	9·00	—	26·06	39·86	14·55	17·74
Gibraltar	662·1	6·70	25·90	16·09	33·68	12·30	18·57
Malta	805·9	12·26	26·17	16·86	40·57	14·81	18·38
Dominion of Canada	640·3	9·04	17·45	13·59	30·21	11·02	17·22
Bermuda	685·9	13·33	22·67	13·56	33·12	12·09	17·62
West Indies	916·5	14·16	27·17	12·76	40·98	14·96	16·32
Cape of Good Hope and St. Helena	1011·4	10·51	24·66	17·27	48·49	17·70	17·50
Mauritius	1799·7	22·38	45·52	13·18	59·01	21·54	11·97
Ceylon	1033·4	16·14	38·00	16·76	50·07	18·03	17·69
China and Straits Settlements	1338·4	15·33	43·37	21·08	50·86	18·57	13·87
India	1409·4	21·85	43·23	16·03	56·28	20·54	14·58
On board Ship	543·3	8·01	—	—	—	—	—

\* Calculated on strength excluding United Kingdom.



## II.—ON THE HEALTH OF THE TROOPS SERVING IN THE UNITED KINGDOM.

### Section I.

#### Sickness and Mortality.

#### STATISTICAL REPORT.

United  
Kingdom.

According to the returns received in the Army Medical Department, the annual average strength of the non-commissioned officers and men in the United Kingdom was 92,143; the admissions into hospital in this number were 74,304, being in the rate of 806·4 per 1,000; there were 636 deaths amongst the men present with their corps, and 67 deaths amongst men detached (the average number of whom is given in the Adjutant-General's return as 5,467); the death rate of the non-commissioned officers and men is therefore 7·20 per 1,000 of the strength.

Compared with the preceding year, the rate of admissions is 7·3, and that of deaths is 1·23 per 1,000 men lower.

The classes and orders of diseases to which the admissions and deaths were due are shown in the following Table:—

Orders.	Average Strength in Weekly Returns, 92,143.  Average Strength, including Men detached, 97,610.	Admitted into Hospital.	Died.			Ratio per 1,000 of Mean Strength.				
			With the Regiment.	Absent from the Regiment.	Total.	1877.		1899-76.		
						Admitted.	Died.	Admitted.	Died.	
I. General Diseases.										
1	Febrile Group . . . . .	4,383	47	6	53	47·6	·54	51·4	·60	
2	Constitutional Group . . . . .	12,465	224	22	246	135·3	2·52	149·0	2·87	
II. Local Diseases.										
Diseases of the—										
1	Nervous System . . . . .	1,090	46	6	52	11·8	·53	12·0	·58	
2	Eye . . . . .	1,433	—	—	—	15·9	—	16·0	—	
3	Ear . . . . .	468	—	—	—	5·1	—	3·7	—	
4	Nose . . . . .	49	—	—	—	·5	—	·5	·01	
5	Circulatory System . . . . .	1,510	88	7	95	14·2	·97	13·9	1·46	
6	Absorbent . . . . .	1,467	—	—	—	16·0	—	13·7	·01	
7	Ductless Glands . . . . .	8	1	—	1	·01	—	·1	—	
8	Respiratory System . . . . .	8,017	103	9	112	87·0	1·15	86·0	1·35	
9	Digestive . . . . .	9,907	28	1	29	107·5	·30	105·3	·58	
10	Urinary . . . . .	8,041	18	3	21	87·2	·22	98·2	·27	
11	Generative . . . . .	1,022	—	—	—	10·8	—	12·4	·0	
12	Organs of Locomotion . . . . .	541	4	—	4	5·9	·04	5·0	—	
13	Cellular Tissue . . . . .	2,265	1	—	1	24·6	·01	22·2	0·3	
14	Cutaneous System . . . . .	9,703	—	1	1	105·3	·01	99·5	—	
III. Conditions, &c.										
	Debility . . . . .	1,079	1	—	1	11·7	·01	8·0	·01	
IV. Poisons . . . . .										
		217	5	1	6	2·3	·06	2·7	·10	
V. Injuries.										
2	Accidental . . . . .	10,524	50	9	59	114·2	·60	104·8	·51	
3	Homicidal . . . . .	2	2	—	2	·3	·02	·2	·03	
4	Self-inflicted . . . . .	22	17	2	19	·2	·20	—	·25	
5	Judicial . . . . .	15	—	—	—	—	—	—	·01	
VI. Surgical Operations . . . . .										
		37	—	—	—	·4	—	·3	—	
	No appreciable Disease . . . . .	239	—	—	—	2·6	—	1·4	·03	
	Not known . . . . .	—	1	—	1	—	·01	·1	—	
		74,304	636	67	703	806·4	7·20	806·4	8·75	

**GENERAL DISEASES.**—The admission rate for this class of diseases shows a trifling increase of 3·6 per 1,000 men over that of last year; the increase occurs entirely in the *febrile group*, the rate for the *constitutional group* being fractionally lower. The rate of mortality is also a little higher for the former and lower for the latter. The admissions and deaths from the principal diseases of this class are shown in the following Table:—

Strength, 92,143.	Admitted.	Died.	Ratio per 1,000 of Mean Strength.	
General Diseases.			Admitted.	Died.
<i>Febrile</i> —				
Eruptive Fevers . . . . .	347	7	3·8	·07
Continued „ . . . . .	2,025	39	22·0	·40
Paroxysmal „ . . . . .	795	1	8·6	·01
Influenza . . . . .	811	—	8·8	—
Erysipelas . . . . .	223	4	2·4	·04
Other Diseases . . . . .	183	2	2·0	·02
Total of Febrile Group . . . . .	4,383	53	47·6	·54
<i>Constitutional</i> —				
Rheumatism . . . . .	4,454	3	48·3	·03
Syphilis . . . . .	3,690	7	72·6	·07
Scrofula, Phthisis, &c. . . . .	1,136	223	12·2	2·29
Scurvy and Purpura . . . . .	23	1	·2	·01
Anæmia . . . . .	116	—	1·5	—
Other Diseases . . . . .	46	12	·5	·12
Total of Constitutional Group . . . . .	12,465	246	135·3	2·52

Compared with the admission rates for last year, those for all the principal diseases of the *febrile group* (except eruptive fevers) are higher, and those for the *constitutional group* (except for rheumatism and anæmia) lower. In the former group the death rate for each of the following forms of fevers, *eruptive*, *enteric*, and *paroxysmal*, is higher, and in the latter it is lower for all the principal diseases.

**LOCAL DISEASES.**—The admission rates for *diseases of the ear, absorbent and ductless glands, urinary system, organs of locomotion, and cellular tissue*, are a little higher than in 1876; the increase for diseases of the *urinary system*, which is the greatest, amounts, however, to only 7·8 per 1,000 of the strength. For the other groups the rates are lower, but in no case is there any marked decrease. The only groups showing higher rates of mortality, and in each case to an unimportant extent, are those of diseases of the *respiratory and cutaneous systems*, in the latter one death only occurred, the man being absent from his Regiment undergoing punishment in the county gaol at Maidstone, where he is reported to have died from Pemphigus.

**CONDITIONS.**—The admission and mortality rates are identical with those of last year.

**POISONS.**—The admission rate is fractionally lower and that of the deaths fractionally higher than last year.

**INJURIES.**—*Accidental.*—The admission rate is lower and the death rate a little higher than in the previous year. *Homicidal.*—The death rate is lower by one half than in 1876. *Self-inflicted.*—The same number of deaths as occurred last year, gives a decreased ratio of ·01 per 1,000 of the strength. *Judicial.*—The higher admission rate than that of 1876 is due to the punishment of 15 men in the Military Prison, Limerick.

United  
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The admissions, deaths, and average number constantly sick in the various Military Districts are shown in the following Table :—

Military Districts.	Average Annual Strength.	Admitted into Hospital.	Died.	Average Number constantly Sick.	Ratio per 1,000 of Mean Strength.			Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.
					Admitted.	Died.	Constantly Sick.		
								Days.	Days.
1. Northern -	7,717	6,569	72	314	851·2	9·33	40·69	14·85	17·45
2. Eastern -	4,504	4,556	32	207	1011·5	7·10	45·96	17·77	16·59
3. Western -	5,754	4,560	37	224	792·6	6·43	38·93	14·21	17·93
4. Southern -	7,437	6,179	66	343	830·8	8·87	46·12	16·84	20·26
5. Chatham -	5,080	4,156	28	202	512·6	5·51	39·76	14·51	17·71
6. South-eastern -	8,414	5,918	34	314	703·4	4·04	37·32	13·62	19·87
7. Home -	6,149	6,448	43	309	730·8	6·99	50·25	18·34	17·49
8. Woolwich -	6,927	5,279	53	245	762·1	7·65	35·37	12·91	16·94
9. Aldershot -	14,416	10,752	67	641	745·9	4·65	44·46	16·23	21·76
10. North British -	3,320	2,555	34	126	769·6	10·24	37·95	13·85	17·96
11. Channel Islands	1,685	1,586	17	57	941·3	10·09	33·83	12·35	13·12
12. Belfast -	2,259	1,686	26	67	746·3	11·51	29·66	10·82	14·50
13. Dublin -	6,526	5,908	52	287	905·3	7·97	43·98	16·05	17·65
14. Curragh -	4,553	3,003	26	139	659·6	5·71	30·53	11·14	16·89
15. Cork -	7,402	5,149	49	219	695·6	6·62	29·59	12·15	17·47
Detached from their Corps.	5,467	—	67	—	—	12·26	—	—	—
Total -	97,610	74,304	703	3,694	806·4	7·20	40·09	14·63	18·15
„ 1867-76	—	—	—	—	820·2	9·00	39·86	14·55	17·74

The Eastern District, as for the two previous years, furnishes the highest rate of admissions, which exceeds that for the Channel Islands, the next on the list, by 70 per 1,000 of the strength, and that for Chatham, where the rate is lowest, by 498 or very nearly one half. The Southern, South Eastern, Channel Islands, Belfast, Dublin, and the Curragh Districts, have higher admission rates than last year, for the remaining Districts the rates are lower. The South Eastern District furnishes the lowest mortality, and the Home District the highest proportion constantly sick, the average Sick-time to each soldier is greatest also in this District. The average duration of each case is the longest in the Aldershot District and the shortest in the Channel Islands.

The results of sickness in the four permanent Camps (which are included in the first Table) are separately grouped in the following one:— *United Kingdom.*

—	Average Annual Strength.	Admitted into Hospital.	Died.	Average Number constantly Sick.	Ratio per 1,000 of Mean Strength.			Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.
					Admitted.	Died.	Constantly Sick.		
Camps -	23,389	17,556	119	982	750·6	5·09	41·99	Days. 15·33	Days. 20·42

The rate of admissions is 92·2 per 1,000 men lower than in the preceding year; the death rate is ·93 per 1,000 lower; the constantly sick rate is 1·05 per 1,000 lower.

The admissions and deaths in each class and order of diseases are shown in the following Table:—

United  
Kingdom.

Class.	Order.	Districts - -		Northern.		Eastern.		Western.		Southern.		Chatham.		South-eastern.	
		Average Strength -		7,717		4,504		5,754		7,437		5,080		8,414	
		—		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
II.	1	General Diseases.	Sub-division A.	294	5	276	2	238	2	354	6	364	—	323	2
	2			1,261	26	683	12	755	11	912	21	657	11	846	16
	1	Local Diseases—Diseases of the	Nervous System -	113	6	36	—	87	5	102	2	57	3	89	3
	2		Eye - - -	122	—	87	—	98	—	120	—	84	—	95	—
	3		Ear - - -	32	—	27	—	41	—	41	—	30	—	38	—
	4		Nose - - -	7	—	4	—	1	—	6	—	4	—	—	—
	5		Circulatory System	93	7	64	7	96	5	169	15	80	2	94	3
	6		Absorbent - -	134	—	65	—	87	—	122	—	45	—	85	—
	7		Ductless Glands -	—	—	—	—	1	—	—	—	1	1	2	—
	8		Respiratory System	587	13	481	7	524	7	671	10	412	7	752	2
	9		Digestive "	644	5	676	2	590	2	845	1	518	1	905	4
	10		Urinary "	816	3	459	1	542	—	738	2	460	1	513	1
	11		Generative "	108	—	66	—	68	—	89	—	62	—	62	—
	12		Organs of Locomotion.	56	—	31	—	28	—	44	—	25	—	30	—
	13		Cellular Tissue -	186	—	179	—	82	—	135	—	137	—	161	—
	14		Cutaneous System	933	—	696	—	604	—	771	—	617	—	771	—
III.		Debility - -		72	—	69	—	49	—	109	—	41	—	92	—
IV.		Poisons - -		21	1	13	—	24	1	6	—	15	—	20	1
V.	2	Injuries.	Accidental - -	1,072	3	629	1	614	3	926	3	527	2	1,013	2
	3		Homicidal - -	2	1	—	—	—	—	—	—	—	—	—	—
	4		Self-inflicted -	1	2	—	—	2	1	1	6	2	—	1	—
	5		Judicial - -	—	—	—	—	—	—	—	—	—	—	—	—
VI.		Surgical Operations.		4	—	2	—	4	—	1	—	5	—	2	—
		Unknown - -		—	—	—	—	—	—	—	—	—	—	—	—
		No appreciable Disease.		11	—	8	—	40	—	17	—	13	—	24	—
		General Total -		6,569	72	4,556	32	4,560	37	6,179	66	4,156	28	5,918	34

*United Kingdom.*

Home.		Woolwich.		Aldershot.		North British.		Channel Islands.		Belfast.		Dublin.		Curragh.		Cork.	
6,140		6,927		14,416		3,320		1,685		2,259		6,526		4,553		7,402	
Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
436	3	774	6	446	2	121	2	54	—	70	2	236	7	72	—	325	8
1,504	18	755	21	2,005	21	379	15	209	1	200	11	1,053	17	539	7	707	16
78	3	81	2	168	9	33	2	23	2	23	—	76	5	42	3	82	1
68	—	104	—	201	—	39	—	40	—	27	—	120	—	71	—	157	—
14	—	30	—	88	—	10	—	8	—	13	—	43	—	12	—	41	—
8	—	1	—	9	—	2	—	1	—	1	—	2	—	1	—	2	—
56	4	88	7	241	10	34	3	34	5	43	2	101	5	49	7	68	6
111	—	47	—	374	—	21	—	53	—	38	—	168	—	47	—	70	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	—
784	8	397	9	1,121	13	316	5	125	—	176	2	759	9	296	4	616	7
872	—	827	2	1,331	1	413	2	254	2	234	1	672	2	341	1	796	2
781	1	478	3	1,087	2	210	—	284	—	198	—	725	2	347	—	403	2
83	—	56	—	194	—	32	—	11	—	32	—	67	—	36	—	61	—
39	—	39	—	93	1	24	1	6	—	11	—	42	2	30	—	43	—
342	1	153	—	377	—	86	—	43	—	44	—	209	—	80	—	151	—
603	—	568	—	1,381	—	316	—	182	—	253	—	717	—	564	—	727	—
75	1	51	—	236	—	33	—	10	—	24	—	92	—	25	—	51	—
22	1	18	—	8	—	5	—	15	—	6	—	15	—	4	—	20	1
664	1	749	3	1,299	5	477	4	233	6	239	7	801	3	444	1	787	6
—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—
1	2	4	—	3	2	1	—	—	1	—	—	4	—	1	3	1	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	15	—
6	—	4	—	5	—	1	—	—	—	—	—	2	—	—	—	1	—
—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
1	—	55	—	35	—	2	—	1	—	4	—	4	—	2	—	22	—
6,448	43	5,279	53	10,752	67	2,555	34	1,536	17	1,686	26	5,908	32	3,003	26	5,149	49

F 890.

B

United  
Kingdom.

Ratio per 1,000

Class.	Order.	Districts.	Northern.		Eastern.		Western.		Southern.		Chatham.		South-eastern.		
			Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	
I.	1	General Diseases. { Sub-division A. Sub-division B.	38.1	.65	61.3	.44	41.4	.35	47.6	.81	71.7	—	38.4	.24	
	2		163.4	3.37	151.6	2.66	131.2	1.91	122.6	3.82	129.3	2.17	100.5	1.90	
II.	1	Local Diseases.—Diseases of the	Nervous System -	14.6	.78	8.0	—	15.1	.87	13.7	.27	11.2	.59	10.6	.35
	2		Eye - -	15.8	—	19.3	—	17.0	—	16.1	—	16.5	—	11.3	—
	3		Ear - -	4.1	—	6.0	—	7.1	—	5.5	—	5.9	—	4.5	—
	4		Nose - -	.9	—	.9	—	.2	—	.8	—	.8	—	—	—
	5		Circulatory System	12.1	.90	14.2	1.56	16.7	.87	22.7	2.02	15.7	.39	11.2	.35
	6		Absorbent „	17.4	—	14.4	—	15.1	—	16.4	—	8.9	—	10.1	—
	7		Ductless Glands -	—	—	—	—	.2	—	—	—	.2	.20	.2	—
	8		Respiratory System	76.1	1.68	106.8	1.56	91.1	1.21	90.2	1.34	81.1	1.37	89.4	.24
	9		Digestive „	83.5	.65	150.1	.44	100.8	.35	113.6	.13	102.0	.20	107.6	.48
	10		Urinary „	105.7	.39	101.9	.22	94.2	—	99.3	.27	90.6	.20	61.0	.12
	11		Generative „	14.0	—	14.7	—	10.9	—	12.0	—	12.2	—	7.4	—
	12		Organs of Locomotion.	7.3	—	6.9	—	4.9	—	5.9	—	4.9	—	3.6	—
	13		Cellular Tissue -	24.1	—	39.7	—	14.3	—	18.2	—	27.0	—	19.1	—
	14		Cutaneous System	120.9	—	154.5	—	104.9	—	103.7	—	121.4	—	91.6	—
III.		Debility - -	9.3	—	15.3	—	8.5	—	14.7	—	8.1	—	10.9	—	
IV.		Poisons - -	2.7	.13	4.0	—	4.2	.17	.8	—	2.9	—	2.4	.12	
V.	2	Injuries.	Accidental -	138.9	.39	139.7	.22	106.7	.52	124.5	.40	103.7	.39	120.4	.24
	3		Homicidal -	.3	.13	—	—	—	—	—	—	—	—	—	—
	4		Self-inflicted -	.1	.26	—	—	.3	.17	.1	.81	.4	—	.1	—
	5		Judicial - -	—	—	—	—	—	—	—	—	—	—	—	—
VI.		Surgical Operations.	.5	—	.4	—	.7	—	.1	—	1.0	—	.2	—	
		Not yet diagnosed	—	—	—	—	—	—	—	—	—	—	—	—	
		No appreciable Disease.	1.4	—	1.8	—	7.0	—	2.3	—	2.6	—	2.9	—	
		General Total	851.2	9.33	1011.5	7.10	792.5	6.42	830.8	8.87	818.1	5.51	703.4	4.04	



of Strength.

*United  
Kingdom.*

Home.		Woolwich.		Aldershot.		North British.		Channel Islands.		Belfast.		Dublin.		Curragh.		Cork.	
Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
70'9	'49	111'7	'87	30'9	'14	36'5	'60	32'0	—	31'0	'89	36'2	1'07	15'8	—	43'9	1'06
244'6	2'93	109'0	3'03	139'1	1'46	114'2	4'52	124'0	'59	88'5	4'86	161'4	2'60	118'4	1'54	95'5	2'16
12'7	'49	11'7	'29	11'7	'62	9'9	'60	13'7	1'19	10'2	—	11'6	'76	9'2	'66	11'1	'14
11'0	—	15'0	—	13'9	—	11'8	—	23'7	—	11'9	—	18'4	—	15'6	—	21'2	—
2'3	—	4'3	—	6'1	—	3'0	—	4'7	—	5'8	—	6'6	—	2'6	—	5'5	—
1'3	—	'1	—	'6	—	'6	—	'6	—	'4	—	'3	—	'2	—	'3	—
9'1	'65	12'7	1'01	16'7	'69	10'2	'90	20'2	2'97	19'0	'89	15'5	'76	10'8	1'54	9'2	'61
18'0	—	6'8	—	25'9	—	6'3	—	31'5	—	16'8	—	25'7	—	10'3	—	9'5	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	'5	—
127'5	1'30	57'3	1'29	77'8	'90	95'2	1'51	74'2	—	77'9	'89	116'3	1'38	65'0	'87	83'2	'94
141'8	—	119'4	'29	92'3	'07	124'4	'60	150'7	1'19	103'6	'44	103'0	'31	74'9	'22	107'4	'37
127'0	'16	69'0	'43	75'4	'14	63'3	—	168'6	—	87'6	—	111'1	'31	76'2	—	54'5	'27
13'5	—	8'1	—	13'5	—	9'6	—	6'5	—	14'2	—	10'3	—	7'9	—	8'3	—
6'3	—	5'6	—	6'5	'07	7'2	'30	3'6	—	4'9	—	6'4	'31	6'6	—	5'8	—
39'3	'16	23'1	—	26'2	—	25'9	—	25'5	—	19'5	—	32'0	—	17'6	—	20'4	—
96'1	—	82'0	—	95'8	—	95'2	—	106'0	—	112'0	—	109'9	—	123'9	—	96'2	—
12'2	'16	7'4	—	19'8	—	9'9	—	5'9	—	10'6	—	14'1	—	5'5	—	6'9	—
3'6	'16	2'6	—	'6	—	1'5	—	8'9	—	2'7	—	2'3	—	'9	—	2'7	'14
108'0	'16	108'2	'44	90'1	'35	143'7	1'21	138'3	3'56	127'9	3'10	122'7	'46	97'5	'22	106'3	'81
—	—	—	—	—	—	—	—	—	—	—	'44	—	—	—	—	—	—
'2	'33	'6	—	'2	'14	'3	—	—	'59	—	—	'6	—	'2	'66	'1	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2'0	—
1'0	—	'6	—	'3	—	'3	—	—	—	—	—	'3	—	—	—	'1	—
—	—	—	—	—	'07	—	—	—	—	—	—	—	—	—	—	—	—
'2	—	7'9	—	2'4	—	'6	—	'6	—	1'8	—	'6	—	'5	—	3'0	—
1048'6	6'99	763'1	7'65	745'8	4'65	769'6	10'24	941'2	10'09	746'3	11'51	905'3	7'96	659'6	5'71	695'6	6'62

United  
Kingdom.

GENERAL DISEASES.—Compared with the preceding year the rate of admissions eastern by 2, for the Home by 28, for the Woolwich by 22, for the Channel districts, except for Cork, which has the same rate in both years.

The rates of admissions and of deaths in the two groups of this class are shown

Districts - . . .		Northern.		Eastern.		Western.		Southern.		Chatham.		South-eastern.		
Class of Diseases.		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	
Average Strength . . .		7,717		4,504		5,754		7,437		5,080		8,414		
CLASS I.—GENERAL DISEASES.	Febrile Group.	Eruptive Fevers . . .	21	—	20	—	14	1	58	2	14	—	45	—
		Continued „ . . .	152	4	146	1	81	1	206	3	234	—	156	2
		Paroxysmal „ . . .	68	—	72	—	113	—	67	—	93	—	73	—
		Influenza . . .	19	—	9	—	6	—	9	—	2	—	14	—
		Erysipelas . . .	23	—	15	1	18	—	12	1	5	—	22	—
		Other Diseases . . .	11	1	14	—	6	—	2	—	16	—	13	—
	Total of Febrile Group . . .		294	5	276	2	238	2	354	6	364	—	323	2
	Constitutional Group.	Rheumatism . . .	296	—	277	—	319	—	333	—	281	—	416	—
		Syphilis . . .	828	1	351	—	361	1	438	—	307	—	308	1
		Scrofula, Phthisis, &c.	116	24	51	10	67	9	128	20	52	10	111	15
		Scurvy and Purpura .	—	—	—	—	1	—	1	—	2	—	—	—
		Anæmia . . .	13	—	2	—	3	—	7	—	13	—	8	—
		Other Diseases . . .	8	1	2	2	4	1	5	1	2	1	3	—
	[Total of Constitu- tional Group] . . .		1,261	26	683	12	755	11	912	21	657	11	846	16

Ratio per 1,000

CLASS I.—GENERAL DISEASES.	Febrile Group.	Eruptive Fevers	-	2.7	—	4.5	—	2.4	.17	7.8	.27	2.8	—	5.4	—
		Continued "	-	19.7	.52	32.4	.22	14.1	.17	27.7	.40	46.1	—	18.5	.24
		Paroxysmal "	-	8.8	—	16.0	—	19.6	—	9.0	—	18.3	—	8.7	—
		Influenza "	-	2.5	—	2.0	—	1.1	—	1.2	—	.4	—	1.7	—
		Erysipelas	-	3.0	—	3.3	.22	3.1	—	1.6	.13	1.0	—	2.6	—
		Other Diseases	-	1.4	.13	3.1	—	1.1	—	.3	—	3.1	—	1.5	—
		Total of Febrile Group - }		38.1	.65	61.3	.44	41.4	.34	47.6	.80	71.7	—	38.4	.24
	Constitutional Group.	Rheumatism	-	33.4	—	61.5	—	55.4	—	44.3	—	55.3	—	49.4	—
		Syphilis	-	107.3	.13	77.9	—	62.7	.17	58.9	—	60.4	—	36.6	.12
		Scrofula, Phthisis, &c.		15.0	3.11	11.3	2.22	11.7	1.57	17.2	2.69	10.2	1.97	13.2	1.78
		Scurvy and Purpura	-	—	—	—	—	.2	—	.1	—	.4	—	—	—
		Anæmia	-	1.7	—	.5	—	.5	—	.9	—	2.6	—	.9	—
		Other Diseases	-	1.0	.13	.5	.44	.7	.17	.7	.13	.4	.20	.4	—
		Total of Constitutional Group - }		163.4	3.37	151.7	2.66	131.2	1.91	122.6	2.82	129.3	2.17	100.5	1.90

for diseases of this class is higher for the Chatham District by 29, for the South- *United* Islands by 11, and for the Curragh by 13, the rate is lower for each of the other *Kingdom*, in the following Tables.

Home.		Woolwich.		Aldershot.		North British.		Channel Isles.		Belfast.		Dublin.		Curragh.		Cork.	
Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
6,149		6,927		14,416		3,320		1,685		2,259		6,526		4,553		7,402	
63	—	23	2	23	—	19	2	—	—	2	—	20	—	11	—	14	—
221	3	114	4	229	1	27	—	41	—	42	1	151	7	43	—	182	8
26	—	128	—	57	—	29	—	6	—	5	—	18	—	11	—	29	—
90	—	473	—	31	—	32	—	7	—	9	—	30	—	3	—	78	—
27	—	18	—	30	1	11	—	—	—	7	1	12	—	4	—	18	—
9	—	19	—	76	—	3	—	—	—	5	—	5	—	—	—	4	—
436	3	774	6	446	2	121	2	54	—	70	2	236	7	72	—	325	8
354	1	229	—	911	1	133	—	47	—	73	—	303	—	210	—	272	—
1,012	—	414	1	939	—	194	1	139	—	94	1	688	—	271	—	346	—
126	16	80	19	138	18	40	13	18	1	28	10	54	17	49	7	78	15
3	—	1	—	2	—	—	—	—	—	1	—	2	—	5	—	5	1
5	—	29	—	10	—	11	—	2	—	1	—	3	—	4	—	5	—
4	1	2	1	5	2	1	1	3	—	3	—	3	—	—	—	1	—
1,504	18	755	21	2,005	21	379	15	209	1	200	11	1,053	17	539	7	707	16

of Strength.

10.3	—	3.3	.29	1.6	—	5.7	.60	—	—	.9	—	3.1	—	2.4	—	1.9	—
35.9	.40	16.4	.58	15.9	.07	8.1	—	24.3	—	18.6	.44	23.1	1.07	9.4	—	24.6	1.08
4.2	—	18.5	—	3.9	—	8.8	—	3.6	—	2.2	—	2.8	—	2.4	—	3.9	—
14.6	—	68.1	—	2.1	—	9.7	—	4.1	—	4.0	—	4.6	—	.7	—	10.5	—
4.4	—	2.6	—	2.1	.07	3.3	—	—	—	3.1	.44	1.8	—	.9	—	2.4	—
1.5	—	2.8	—	5.3	—	.9	—	—	—	2.2	—	.8	—	—	—	.6	—
70.9	.49	111.7	.87	30.9	.14	36.5	.60	32.0	—	31.0	.88	36.2	1.07	15.8	—	43.9	1.08
57.6	.16	33.1	—	63.2	.07	40.1	—	27.9	—	32.3	—	46.4	—	46.1	—	36.8	—
164.6	—	59.8	.14	65.1	—	58.4	.30	82.5	—	41.6	.44	105.4	—	59.5	—	46.7	—
20.5	2.60	11.5	2.75	9.6	1.25	12.1	3.92	10.7	.59	12.4	4.43	8.3	2.60	10.8	1.54	10.5	2.02
.5	—	.1	—	.1	—	—	—	—	—	.4	—	.3	—	1.1	—	.7	.14
.8	—	4.2	—	.7	—	3.3	—	1.1	—	.4	—	.5	—	.9	—	.7	—
.6	.16	.3	.14	.4	.14	.3	.30	1.8	—	1.4	—	.5	—	—	—	.1	—
244.6	2.92	109.0	3.03	139.1	1.46	114.2	4.52	124.0	.59	88.5	4.87	161.4	2.60	118.4	1.54	95.5	2.16

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**Eruptive Fevers.**—Compared with the preceding year, the rate of admissions for fevers of this kind is higher for the Eastern, Western, Southern, South-eastern, Home, North British, Dublin, and Curragh Districts; for each of the others the rate is lower. The highest rate in the present year is that of the Home, which is raised chiefly by the unusual prevalence of measles in the district, the same disease also prevailed to a comparatively considerable extent in the Southern District.

**Continued Fevers.**—Compared with the preceding year the rate of admissions is higher for the Eastern District by 1·6 per 1,000 men, for the Southern by 7·8, for the Chatham by 24·3, for the South-eastern by 3·5, for the Dublin by 5·7, and for the Cork by 7·1. The rate of admissions is lower for each of the remaining districts, the decrease in no instance is important, the greatest being only 6·4 per 1,000 men, that for the Curragh District.

**Typhus Fever.**—The three admissions for this form of fever were—in the Northern District one, in the Woolwich one, and in the Cork one.

**Enteric Fever.**—The admissions for this fever for all districts together were 82, being in the rate of ·89 per 1,000 of the strength, which is ·17 per 1,000 lower than the corresponding rate of the preceding year. The deaths were 28, being in the proportion of 341·9 per 1,000 of the attacks; assuming that the normal rate of mortality from this disease in the United Kingdom is 205 per 1,000 of those attacked, the rate of mortality in excess of this raises the suspicion that the real prevalence of enteric fever amongst the troops in the various districts may have been greater than that shown above. Admissions for this fever took place in every district except that of the Channel Islands; in the Chatham only one occurred. As in the preceding year the highest rate of prevalence is that of the Home district, 1·95 per 1,000 men, but as was also the case in 1876 in this district the rate of mortality to cases treated, 250 per 1,000, is not the highest, the corresponding rate for Cork is 500 per 1,000, and that for Dublin is 600 per 1,000.

**Simple Continued Fever.**—The highest rates of prevalence of this form of fever are those of the same districts which have the highest rates of prevalence of enteric fever, namely, the Home, the Cork, and the Dublin; for the first-named the rate is 13·99 per 1,000 men, for the next it is 4·05, and for Dublin it is 6·44. No deaths from this disease are returned, however, for the Home district, one is returned for the Dublin, and one for the Cork.

**Febricula.**—The rate of admissions for all districts together is 18·55 per 1,000 men, showing an increase of 3·39 per 1,000 men on the rate of the preceding year. No death was due to *febricula*. The highest admission rate for this disease is that of the Chatham district 45·67 per 1,000 men; the lowest is that of the North British 5·36 per 1,000.

**Paroxysmal Fevers.**—The rate of prevalence of these forms of fevers for all districts together is fractionally lower (·2 per 1,000 men) than in the preceding year, the rate is higher for the Northern by 4 per 1,000 men, for the Eastern by 4·1, for the Western by 11·7, for the South-eastern by 4·2, for the Home and for the Cork district the rate is fractionally higher. The rate is lower for the Southern by 3 per 1,000, for the Chatham by 1·7, for the Woolwich by 3·4, for the North British by 10·7, for the Channel Islands by 8·9, for the Curragh by 2·7, and it is fractionally lower for the Aldershot, Belfast, and Dublin districts. The comparative prevalence of paroxysmal fevers in the various districts is chiefly in relation to the presence of corps which have recently returned from abroad.

**Influenza.**—The rates of admissions for this disease in the different districts, vary from 68·1 per 1,000 men in the Woolwich, to ·4 per 1,000 in the Chatham. No useful comparison can, therefore, be made of rates which evidently show merely the influence of individual views in the diagnosis of illness.

**Erysipelas.**—The rate of admissions for all districts together is ·4 per 1,000 men higher than in the preceding year; for the Northern district there is an increase of 1·1 per 1,000 men, for the Eastern of ·5, for the Chatham of ·1, for the South-eastern and also for the Home district of 1·7, for the Woolwich of ·3, for the North British of ·9, for the Belfast of 1·5, and for the Cork of ·9. The rate is lower for the Western district by ·1, for the Southern by ·2, for the Aldershot by ·5, for the Channel Islands by ·6, for the Dublin by ·3, and for the Curragh by ·3.

*Rheumatism*.—For all districts together the rate of admissions is 1·3 per 1,000 men higher than in the preceding year; the rate is higher for the Western district by 16 per 1,000, the Southern by 3·7, the Chatham by 9·1, the South-eastern by 3·8, the Home by 5·9, the Aldershot by 2·9, the Channel Islands by 2·3, and fractionally for the Belfast, the Dublin, and the Cork; for each of the remaining districts the rate is lower, the greatest decrease being 9·9 per 1,000 for the Eastern.

*Syphilis*.—For all districts together the rate of admissions is ·8 per 1,000 men lower than in the preceding year.

In continuation of the statistical information given in the reports of previous years, the admissions for primary venereal sores at certain large stations in the United Kingdom, and their rates per 1,000 of the average annual strength, are shown in the following Table:

Stations under the Act.

Stations.	Average Annual Strength.	Admitted for Primary Venereal Sores.	Admitted for Gonorrhœa.	Ratio per 1,000 of the Strength admitted for Primary Venereal Sores.	Ratio per 1,000 of the Strength admitted for Gonorrhœa.
Devonport and Plymouth -	2,934	83	239	28	81
Portsmouth -	4,575	124	369	27	81
Chatham, Sheerness, and Gravesend.	5,080	219	429	43	84
Woolwich -	6,246	179	395	29	63
Aldershot -	14,416	657	978	46	68
Windsor -	1,020	82	77	80	76
Shorncliffe -	2,932	62	117	21	40
Colchester -	2,502	79	158	52	63
Winchester -	1,004	18	119	18	119
Dover -	3,225	62	178	19	55
Canterbury -	1,378	26	107	19	73
Maidstone -	119	4	8	34	67
Cork -	2,437	39	90	16	37
Curragh -	4,554	175	321	38	70
Total of 14 stations under the Act -	52,422	1,809	3,585	35	68

Stations not under the Act.

Isle of Wight -	1,092	56	95	51	87
London -	3,979	660	598	166	150
Warley -	1,129	67	138	59	122
Hounslow -	621	30	39	48	63
Pembroke Dock -	863	14	56	16	65
Sheffield -	881	56	90	64	102
Manchester -	1,198	157	214	131	180
Preston -	848	65	98	77	116
Edinburgh -	1,122	53	74	47	66
Fermoy -	886	26	42	29	47
Limerick -	845	63	79	75	93
Athlone -	709	25	41	35	58
Dublin -	4,131	425	574	103	139
Belfast -	772	33	96	43	124
Total of 14 stations not under the Act -	19,076	1,730	2,234	91	117

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Stations.	Rate of Admissions into Hospital per 1,000 of Mean Strength for Primary Venereal Sores in—										
	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877
Devonport and Plymouth.	76	66	74	58	50	59	37	36	29	27	28
Portsmouth - -	116	86	62	51	41	40	44	48	30	27	27
Chatham and Sheerness.	71	63	41	47	65	49	41	33	17	33	43
Woolwich - -	88	46	52	43	58	60	60	47	59	42	29
Aldershot - -	81	77	63	67	65	62	72	52	46	47	46
Windsor - -	58	136	93	67	78	96	84	63	41	41	80
Shorncliffe - -	42	77	60	100	30	33	21	14	18	22	21
Colchester - -	145	182	85	42	32	55	42	20	32	30	52
Winchester - -	52	104	101	61	29	57	27	38	27	20	18
Dover - -	132	111	80	30	24	47	38	37	27	30	19
Canterbury - -	119	114	45	152	38	43	20	36	12	27	19
Maidstone - -	242	122	128	68	44	57	59	66	7	28	34
Cork - -	72	61	73	68	55	62	61	26	21	21	16
Curragh - -	104	85	88	56	35	50	30	46	35	18	38
Isle of Wight - -	59	103	129	64	66	57	37	89	89	54	51
London - -	163	148	144	160	190	199	185	179	187	146	166
Warley - -	74	92	61	55	57	66	22	32	37	52	59
Hounslow - -	62	106	85	83	45	90	67	68	24	75	48
Pembroke Dock - -	28	35	51	54	28	27	25	21	31	29	16
Sheffield - -	163	107	146	77	126	98	71	49	87	119	64
Manchester - -	177	115	160	92	70	98	91	106	89	113	131
Preston - -	87	87	172	134	75	114	123	97	57	77	77
Edinburgh - -	63	46	60	99	69	43	44	25	27	89	47
Fermoy - -	70	47	116	89	33	56	21	10	12	31	29
Limerick - -	117	114	54	136	57	100	78	58	25	47	75
Athlone - -	85	38	42	44	47	14	14	8	10	8	35
Dublin - -	129	139	180	128	117	165	136	95	73	76	103
Belfast - -	89	56	52	43	61	8	103	64	44	57	43

The group of 14 stations under the Act shows an increase of 2 per 1,000 men on the corresponding rate of the preceding year; the contrasted group of 14 stations shows an increase of 9 per 1,000 men.

\* Stoppage of pay in force.

The results obtained by a different grouping of the stations in the United *United Kingdom.* Kingdom are shown in the following Table :—

Groups.	Average Annual Strength.	Admissions into Hospital for Primary Venereal Sores.	Ratio per 1,000 of the Strength of Admissions for Primary Venereal Sores.
The 14 stations under the Contagious Diseases Act.	52,422	1,809	35
All other stations - -	39,721	2,690	68

No admissions for this disease are returned at 37 stations having an aggregate average annual strength of 2,572 men.

The following paper relating to the Contagious Diseases Act, was presented to Parliament.

TABLES relating to the CONTAGIOUS DISEASES ACTS, as regards the ARMY, contrasting the Results at 28 Large Stations in the United Kingdom, being all at which the Force was 500 Men and upwards, when the first Act was applied.

I.—TABLES showing the Admissions into Hospital for Primary Venereal Sores and for Gonorrhœa at 28 Stations of Troops in the United Kingdom, from 1860.

Year.	The Fourteen Stations successively brought under the Acts.					Fourteen Large Stations not under the Acts.				
	Average Annual Strength.	Admissions into Hospital for Primary Venereal Sores.	Admissions into Hospital from Gonorrhœa.	Ratio per 1,000 of the Strength.		Average Annual Strength.	Admissions into Hospital for Primary Venereal Sores.	Admissions into Hospital from Gonorrhœa.	Ratio per 1,000 of the Strength.	
				Primary Venereal Sores.	Gonorrhœa.				Primary Venereal Sores.	Gonorrhœa.
1860 - - -	57,479	8,405	7,966	146	139	17,118	2,292	2,374	134	139
1861 - - -	51,328	7,267	7,133	142	139	17,126	2,049	2,023	120	118
1862 - - -	45,322	5,314	6,283	117	139	15,026	1,500	2,070	100	138
1863 - - -	43,419	4,653	5,202	107	120	15,132	1,612	1,816	107	120
Totals for 4 years -	197,548	25,639	26,584	—	—	64,402	7,453	8,285	—	—
Average for 1860-63 -	49,387	6,410	6,646	130	135	16,100	1,863	2,071	116	129
1864 - - -	40,694	4,135	4,803	102	118	14,894	1,647	1,636	111	110
1865 - - -	43,078	4,077	4,937	95	115	14,081	1,418	1,968	101	140
1866 - - -	39,476	3,444	4,573	87	116	14,596	1,154	1,665	79	114
1867 - - -	39,911	3,640	5,274	91	132	20,589	2,372	2,670	115	130
1868 - - -	42,595	3,533	5,685	83	133	19,436	2,130	2,236	109	115
1869 - - -	42,017	2,765	4,466	66	106	17,739	2,273	1,856	128	105
Totals for 6 years -	247,771	21,594	29,738	—	—	101,394	10,994	12,029	—	—
Average for 1864-69 -	41,295	3,599	4,956	87	120	16,899	1,832	2,005	108	119
1870 - - -	41,580	2,268	4,061	55	98	17,352	2,022	1,723	113	96
1871 - - -	54,096	2,763	6,254	51	116	19,957	1,865	2,137	93	107
1872 - - -	50,794	2,752	5,220	54	104	19,950	2,457	2,113	123	106
1873 - - -	48,039	2,420	3,946	50	82	19,301	2,025	1,888	102	95
1874 - - -	48,136	2,039	2,968	42	62	18,379	1,661	1,450	88	77
1875 - - -	48,606	1,717	2,825	35	58	19,573	1,552	1,405	79	72
1876 - - -	48,620	1,623	3,302	33	68	18,790	1,554	1,677	82	89
1877 - - -	52,422	1,809	3,585	35	68	19,076	1,730	2,234	91	117
Totals for 8 years -	392,293	17,390	32,241	—	—	153,878	14,866	14,627	—	—
Average for 1870-77 -	49,037	2,174	4,030	44	82	19,235	1,858	1,828	97	95



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N.B.—For the years 1860–66, inclusive, Windsor has been omitted from the group of stations under the Act, and London from that *not* under the Act, as the returns for those years do not afford the necessary information.

II.—TABLES showing the Number of Men always in Hospital with Primary Venereal Sores at 28 Stations, for Troops in the United Kingdom, in each Year, from 1870 to 1877, inclusive.

Year.	Under the Act.			Not under the Act.		
	Average Annual Strength.	Constantly in Hospital with Primary Venereal Sores.	Ratio per 1,000 of the Strength.	Average Annual Strength.	Constantly in Hospital with Primary Venereal Sores.	Ratio per 1,000 of the Strength.
1870	41,530	186	4.46	17,352	174	9.74
1871	54,096	210	3.89	19,957	161	8.07
1872	50,794	232	4.56	19,950	235	11.29
1873	48,039	214	4.45	19,801	175	8.86
1874	48,136	150	3.11	18,879	130	6.89
1875	48,606	129	2.66	19,573	115	5.88
1876	48,620	120	2.47	18,790	112	5.94
1877	52,422	137	2.61	19,076	119	6.23
Total	392,293	1,373	—	153,878	1,211	—
Average for 8 years	49,037	172	3.51	19,235	151	7.85

For the four years (1860–63) preceding that in which the first Contagious Diseases Act was passed, the average rate of prevalence of primary venereal sores at a group of stations, each of which was successively placed under the Act, is 130, and that for gonorrhœa is 135 per 1,000 of the strength. At another group of 14 stations (originally selected for comparison because at the time the stations comprised in it were large ones, that is, had not less than 500 men) the rate of prevalence of primary venereal sores is 116, and that for gonorrhœa is 129 per 1,000 of the strength.

In the next period shown (1864–69) the Act was applied successively at each of the stations in the subjected group; in 1865 it was in operation at three stations, in 1866 at four, in 1867 at five, in 1868 at eight, in 1869 at 10, in 1870 it was in operation at all the 14 stations. During this period the average rate of prevalence of primary venereal sores fell to 87 per 1,000 of the strength, in the subjected group; in the contrasted group of large stations it fell to 108 per 1,000 of the strength. The result, therefore, is that the subjected group of stations which before the application of the Act had a rate of prevalence 14 per 1,000 higher than the unsubjected group, for the period of its partial application, has a rate of prevalence 21 per 1,000 lower than that of the unsubjected group.

In the third period shown (1870–77) the Act was in force for the whole time at every one of the stations in the subjected group, and the average rate of prevalence of the disease fell to 44 per 1,000 men; at the unsubjected group the rate fell to 97 per 1,000 men.

The rate of prevalence of gonorrhœa in the first years of the application of the Act did not materially differ in the two groups of stations; in the last years, however, the results are favourable for the subjected group, the rate of which in 1877, is more than a third lower than that of the unsubjected one.

In Table II. the average number of men always in hospital on account of primary venereal sores at each of the groups of stations for the years 1870–77 is shown. The average rate of the subjected group is less than the half of that of the other,

(Signed) W. M. MUIR,  
Director General, A.M.D.

*Scrofula and Phthisis.*—Compared with the preceding year the rate of admissions fractionally is higher for the Eastern and also for the Chatham District, it is higher by 4.8 per 1,000 men for the Southern, by 4.8 for the

Eastern, by 1·6 for the Woolwich, and by 3·2 for the Channel Islands; the rate is lower by 1·5 for the Northern, by 2·1 for the Aldershot, by 3·2 for the North British, by 5·2 for the Belfast, by 6 for the Dublin, by 1·6 for the Curragh, by 2·6 for the Cork, and fractionally for the Western and the Home Districts.

**LOCAL DISEASES.—Diseases of the Nervous System.**—Compared with the preceding year the rate of admissions is higher for the Northern District, the Western, the Southern, the Woolwich, the Belfast, and the Cork; the rate is lower for each of the other Districts except the Chatham, which has the same in both years.

**Diseases of the Eye.**—In the Channel Islands these affections were much more prevalent than in the preceding year; a considerable increase in the admission rate occurs also for the Cork District; for the remaining Districts, save for the Eastern, where the rate is much lower, no material difference is noticeable. The rate is the highest for the Channel Islands and lowest for the Home District.

**Diseases of the Circulatory System.**—The admission rate is higher than last year for each of the following Districts, the Southern, Chatham, the Channel Islands, Belfast, and Dublin; for the Home District it is exactly the same; for the remainder the rates are lower.

**Diseases of the Respiratory System.**—The admission rates for these diseases range from 57·3 for Woolwich District, which is the lowest, to 127·5 for the Home District, which is the highest. The ratios are lower for the Northern, Eastern, Woolwich, Aldershot, and Belfast Districts than in the previous year, and higher for the remainder.

**Diseases of the Digestive System.**—There was a greater prevalence of these diseases in the Western, Southern, Home, Channel Islands, and Belfast Districts than in 1876. The rate for the Channel Islands is the highest, and that for the Curragh the lowest.

**Diseases of the Urinary System.**—The admission rates are lower for the Western, Woolwich, Aldershot, and Cork Districts than in the preceding year.

The admissions into hospital for gonorrhœa, at specified groups of stations in the United Kingdom, are shown in the following Table:—

Groups.	Average Annual Strength of the Group.	Admissions into Hospital for Gonorrhœa.	Ratio per 1,000 of the Strength of Admissions for Gonorrhœa.
The 14 stations under the Contagious Diseases Act	52,422	3,585	68
At 14 large stations not under the Contagious Diseases Act	19,076	2,234	117
All stations together not under the Contagious Diseases Act (including the 14 large stations)	20,645	1,595	77

**Diseases of the Cutaneous System.**—For the Channel Islands and Belfast the admission rates are within a fraction of those of 1876; for the Northern, Eastern, Western, South-eastern, Woolwich, Aldershot, and North British Districts they are lower, and for the remainder they are higher.

**POISONS.**—For the Eastern District the admission rate is the same as last year; for each of the following, Chatham, the Home, the Channel Islands, Belfast, and Dublin, it is higher. At Woolwich where there was a very high rate of admissions last year there is a considerable reduction. Aldershot shows the lowest rate and the Channel Islands the highest.

**INJURIES.**—The admission rates for accidents in the following Districts are higher than in 1876, the Southern, Home, Chatham, North British, Belfast, Dublin, and the Curragh, and those for the remainder are lower.

**Judicial.**—The admissions entered under this head were cases of flogging from the Military Prison, Limerick.

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The following Table, compiled from the Principal Medical Officers' Returns, shows the admissions, deaths, and number of men invalided from each arm of the service, with the rates per 1,000 of the strength and the corresponding rates for the 10 years previous :—

Arms of the Service.	Average Strength.	Admitted into Hospital.	Died in and out of Hospital.	Invalided as Discharged.	Annual Ratio per 1,000 of Strength.			1867-76.—Annual Ratio per 1,000.		
					Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.
Household Cavalry.	1,213	741	5	16	610·9	4·12	13·19	619·1	7·78	13·99
Cavalry - -	11,730	10,412	68	444	887·6	5·80	37·85	788·2	7·32	28·86
Royal Artillery, including Depot Brigade and Coast Brigade.	16,327	12,684	143	431	776·9	8·76	26·39	906·0	9·86	27·17
Royal Engineers	3,239	2,077	29	86	641·2	8·95	26·55	—	6·60	14·92
Foot Guards -	5,539	5,629	36	138	1016·3	6·50	24·91	726·1	7·89	21·57
Infantry Regiments, including Depôts.	43,469	35,590	326	1,555	818·7	7·50	35·77	724·6	8·02	24·99
Brigade Depôts.	6,178	5,090	66	157	823·9	10·68	25·41	*892·5	*12·05	*45·08
Departmental Corps.	4,425	2,076	30	79	469·2	6·78	17·85	—	10·97	14·07
Total -	92,120	74,299	703	2,906	806·5	7·63	31·55	820·2	9·00	26·06

\* Includes a portion of the Depôts.

Clause 51 of Army Circulars for 1877, having abolished all Regimental Returns, except for the Household Troops, the following unimportant alterations have been made in this Table. The admissions, &c. for the Royal Artillery Depôts and Coast Brigade of the Royal Artillery are included with the Royal Artillery; the same information for such Infantry Depôts as were not formed into Depot Brigades, is included with that for the Infantry, and the Departmental Corps are classed together.

The admission rate for all the Arms, except the Household Cavalry and the Brigade Depôts, is higher than in 1876. In the Household Cavalry it is lower by 55·3 and in the Brigade Depôts by 18·2 per 1,000 of the strength. In the Cavalry it is 2·8, in the Royal Artillery (including the Royal Artillery Depôts and Coast Brigade) 5·6, in the Foot Guards 204·0, and in the Infantry (including depôts of regiments) 58·3 higher. This information was not given for the Royal Engineers and Departmental Corps in last year's Report.

The death rate shows a reduction for all corps except the Household Cavalry and the Royal Engineers, in which it is, respectively, ·80 and 3·93 per 1,000 of the strength higher than in 1876. The decrease amounts for the Cavalry to ·87, for the Royal Artillery to ·46, for the Foot Guards to 3·59, for the Infantry to ·25, for the Brigade Depôts to 2·36, and for Departmental Corps to 2·75 per 1,000 of the strength.

Invaliding shows a higher proportion for all Arms except the Household Cavalry and Brigade Depôts, in the former it is 3·51, and in the latter 17·94 per 1,000 of the strength lower than in the previous year. The increase for the other Arms being at the following rates:—4·58 for the Cavalry, 3·53 for the Royal Artillery, 12·59 for the Royal Engineers, 5·09 for the Foot Guards, 12·03 for the Infantry, and 2·17 for the Departmental Corps.

In the following Table, to the strength of each arm one half of the number of men belonging to it who were placed on the pension list during the year

has been added, and to the mortality of the arm the deaths occurring before the 31st December among the men pensioned from it :— *United Kingdom.*

	1877.			1867-76.
	Average Strength corrected as above.	Deaths of Soldiers and Pensioners.	Ratio of Deaths per 1,000 of the Strength.	Ratio of Deaths of Soldiers and Pensioners per 1,000 of the Strength.
Household Cavalry -	1,242	5	4.03	9.74
Cavalry -	12,003	74	6.17	8.26
Royal Artillery -	16,660	148	8.88	9.99
Foot Guards -	5,956	41	6.88	4.56
Infantry Regiments including all Depôts.	50,394	426	8.45	9.02

Compared with the death rate of soldiers and pensioners for 1876 a decrease is observed in the death rate for all the arms except the Infantry, including Departmental Corps, in which it is only fractionally higher.

#### VACCINATION.

The following Table shows the condition, as to vaccination, of recruits found fit for the service on primary inspection by Army Medical Officers. No information is available respecting those primarily inspected by Civil Medical Practitioners :—

	Number of Recruits found fit for the Service.	Ratio per 1,000
Had marks of vaccination -	21,359	908.6
Had marks of small-pox -	1,281	54.5
Had neither marks of vaccination nor small-pox -	868	36.9
Total -	23,508	1000.0

This table shows a trifling increase in the proportion of recruits with small-pox marks when compared with the returns for 1876, and also of those with neither marks of vaccination nor small-pox, and an unimportant decrease in the proportion of recruits with marks of vaccination.

The following Table, compiled from the Annual Returns, shows the number of soldiers vaccinated during the year, with the proportions per 1,000 of successful vaccinations and failures, when vaccinated with fresh or preserved lymph :—

	Fresh Lymph.		Preserved Lymph.	
	No. of Cases.	Ratio per 1,000	No. of Cases.	Ratio per 1,000
A perfect vesicle -	3,404	479.1	5,148	314.9
A modified vesicle -	2,632	370.4	5,423	331.8
A failure -	1,069	150.5	5,775	353.3
	7,105	1000.0	16,346	1000.0

*United  
Kingdom.*

When compared with last year's Tables an increase is observed in the proportions of perfect vesicles and failures, when vaccinated from either fresh or preserved lymph, and a decrease in the proportion of modified vesicles.

### Section II.

The usual information given in this Section will be found in Section I. in the Table showing the sickness, &c. by arms of the Service.

### Section III.

The usual information cannot be given in consequence of the introduction of the Station-Hospital System.

In Section I. will be found the ratios of the average number constantly sick, the average sick time to each man, and the average duration of each case arranged in Military Districts.

### Section IV.

*On the Influence of Age on the Mortality of the Troops serving in the United Kingdom.*

The rates of mortality at different ages (arranged in quinquennial periods), in the several arms of the service, are shown in the following table:—

Corps.	Annual Ratio of Deaths per 1,000 Living, at the following Ages :—					
	Under 20.	20 and under 25.	25 and under 30.	30 and under 35.	35 and under 40.	40 and up- wards.
Household Cavalry - - -	—	4.77	9.77	—	—	—
Cavalry - - -	1.88	4.06	3.64	6.38	19.20	19.34
Royal Artillery - - -	.57	4.09	5.81	10.63	13.48	26.26
Foot Guards - - -	6.10	4.55	5.03	6.53	16.16	13.07
Infantry - - -	3.60	5.33	6.17	11.35	10.00	22.22
Depôts - - -	4.94	3.17	—	—	18.20	34.18
Brigade Depôts - - -	4.81	5.59	13.00	5.59	17.50	27.18
Average of all Troops at Home	3.32	4.78	5.74	9.11	13.08	23.10
Ditto ditto 1867-76	3.14	5.58	6.92	12.91	18.48	23.96
Civil Male { England and Wales	7.41	8.42	9.21	10.23	11.63	13.55
Population { Healthy Districts -	5.83	7.30	7.93	8.36	9.00	9.86

### Section V.

*On the Recruiting of the Army.*

The Annual Returns show that 43,803 recruits were inspected during the year; of these 33,506 were examined by Army Medical Officers, and 10,297 by Civil Medical Practitioners. At their primary inspection 9,998 or 298.39 per 1,000 were rejected by Army Medical Officers, and 1,642 or 159.46 per 1,000 by Civil Medical Practitioners; on secondary inspection 1,197 more were ascertained to be unfit, bringing up the total number of rejections to 12,837 or 293.06 per 1,000 of the number examined; the ratio of rejections is 19.94 per 1,000 higher than in 1876.

The following Table shows the numbers inspected and rejected, and the ratios of rejections per 1,000 examined :— *United Kingdom.*

	Number of Recruits Primarily Inspected.	Number Rejected.			Ratio of Rejections per 1,000 Inspected.	
		On Primary Inspection.	On Secondary Inspection.	Total.	Primary Inspections.	Both Primary and Secondary Inspections.
By Army Medical Officers	33,506	9,998	1,197	12,837	298·39	293·06
By Civil Medical Practitioners	10,297	1,642			159·46	
Total -	43,803	11,640	1,197	12,837	265·74	293·06

Army Medical Officers rejected a much larger proportion of recruits and Civil Medical Practitioners a much smaller proportion than in 1876.

The native countries of recruits, the ratios of rejections, and the proportion per 1,000 furnished by each country, are given in the following Table :—

Native Countries of Recruits.	Examined by Army Medical Officers.		Examined by Civil Medical Practitioners.		Rejected on Secondary Inspection.	Total.		Proportion Rejected per 1,000 Inspected.	Proportion per 1,000 of Recruits furnished by each Country.
	Inspected.	Rejected.	Inspected.	Rejected.		Primarily Inspected.	Rejected at Primary and Secondary Inspections.		
England and Wales	22,822	6,761	8,257	1,363	900	31,079	9,024	290·36	709·5
Scotland -	3,356	1,065	581	79	95	3,937	1,239	314·71	89·9
Ireland -	6,982	2,078	1,431	196	196	8,413	2,472	293·83	192·1
British Colonies and Foreign Countries	346	94	28	2	6	374	102	272·73	8·5
Total -	33,506	9,998	10,297	1,642	1,197	43,803	12,837	293·06	1000·0

The ratios of rejections are much higher for each country than in 1876 : Scotland again, in this respect, standing highest on the list. Ireland and Foreign Countries each furnished a larger, and England and Scotland a smaller proportion of recruits than in the preceding year.

The following Table shows the number of recruits inspected for each arm of the service, the number rejected, the ratios of rejections, and the proportion per 1,000 inspected for each arm :—

Arms of the Service.	Examined by Army Medical Officers.		Examined by Civil Medical Practitioners.		Total Primary Inspections.		Rejected at Secondary Inspections.	Total Rejected at Primary and Secondary Inspections.	Ratio of Rejections per 1,000 of Recruits Inspected.	Proportion per 1,000 of Recruits examined for each Arm.
	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.				
Household Cavalry -	284	83	—	—	284	83	6	89	313·38	6·5
Cavalry of the Line -	3,210	835	236	23	3,446	856	22	878	254·79	78·7
Royal Artillery -	4,213	1,196	1,037	145	5,250	1,341	139	1,480	281·90	119·9
Royal Engineers -	1,007	300	42	4	1,049	304	5	309	294·57	23·9
Foot Guards -	647	193	1,203	219	1,850	412	264	676	365·40	42·2
Infantry Regiments -	23,231	7,199	7,772	1,261	31,003	8,450	759	9,209	297·04	707·8
Departmental Corps	914	194	7	—	921	194	2	196	212·81	21·0
Total -	33,506	9,998	10,297	1,642	43,803	11,640	1,197	12,837	293·06	1000·0

*United Kingdom.*

With the exception of the Foot Guards (which, however, again shows the highest proportion of rejections) the rejections were considerably higher for all the arms of the service than in 1876.

The occupations of recruits before enlistment, the proportions rejected, and furnished by each group, are shown in the following Table :—

Occupations of Recruits.	Number Inspected.	Number Rejected at Primary Inspection.	Number Rejected at Secondary Inspection.	Total Rejected.	Ratio per 1,000 Rejected.	Proportion per 1,000 of Recruits furnished by each Group of Occupations.
1. Labourers, Servants, Husbandmen, &c.	27,171	7,108	785	7,893	290·49	620·3
2. Manufacturing Artisans (as Clothworkers, Weavers, Lace Makers, &c.).	4,727	1,331	87	1,418	299·98	107·9
3. Mechanics employed in Occupations favourable to physical development (as Smiths, Carpenters, Masons, &c.).	7,756	2,166	273	2,439	314·47	177·1
4. Shopmen and Clerks - -	3,020	865	43	908	300·66	69·0
5. Professional Occupations, Students, &c.	444	113	5	118	265·77	10·1
6. Boys under 17 years of age -	685	57	4	61	89·05	15·6
Total - - -	43,803	11,640	1,197	12,837	293·06	1,000·0

The proportion of rejections for each group, except No. 2 (manufacturing artisans), is higher than last year; No. 3 (mechanics, &c.) shows the highest, and No. 6 (boys) the lowest ratio of rejections. The proportions per 1,000 furnished by Nos. 2 and 6 are lower, and those by the remaining groups higher than in 1876.

The state of education of recruits primarily inspected by Army Medical Officers is shown in the following Table. There is no information available on this head respecting those examined by Civil Medical Practitioners :

	Numbers Examined.	Ratio per 1,000.
Unable to read - - - -	5,441	162·4
Able to read only - - - -	2,611	77·9
Able to read and write - - - -	25,454	759·7
Total - - - -	33,506	1,000·0

The state of education as shown by this Table is more favourable than last year, there being a marked rise in the proportion of recruits "able to read and write" (of nearly 31 per 1,000) and a considerable fall under the two other heads.

Table showing the number of recruits rejected in 1877, with the causes of rejection arranged in classes, and the ratio per 1,000 in each class :—

*United Kingdom.*

Numbers inspected	Recruits Rejected on Primary Inspection.						In- Rejections on Secondary Inspection.	Total Rejections on Primary and Secondary Inspections.	
	Examined by Army Medical Officers.		Examined by Civil Medical Practitioners.		Total.			Numbers Rejected.	Ratio per 1,000 Rejected.
	33,506		10,297		43,803				
Causes of Rejections, in Classes.	Numbers Rejected.	Ratio per 1,000 Rejected.	Numbers Rejected.	Ratio per 1,000 Rejected.	Numbers Rejected.	Ratio per 1,000 Rejected.	Rejections on Secondary Inspection.	Numbers Rejected.	Ratio per 1,000 Rejected.
1. Syphilis - - -	510	15.23	111	10.78	621	14.18	59	680	15.52
2. Scrofula - - -	196	5.85	28	2.71	224	5.11	30	254	5.80
3. Phthisis - - -	157	4.69	65	6.31	222	5.07	26	248	5.66
4. Impaired Constitution	282	8.42	37	3.59	319	7.28	39	358	8.17
5. Muscular Tenuity and Debility.	1,512	45.34	111	10.78	1,630	37.21	137	1,767	40.34
6. Other General Diseases	161	4.80	11	1.07	172	3.93	21	193	4.41
7. Diseases of Nervous System.	45	1.34	5	.49	50	1.14	9	59	1.35
8. Weakness of Intellect -	68	2.03	1	.10	69	1.57	13	82	1.87
9. Defective Vision	1,669	49.81	272	26.42	1,941	44.31	166	2,107	48.10
10. Diseases of Eyes and Eyelids.	132	3.94	15	1.46	147	3.36	25	172	3.93
11. Diseases of Nose and Mouth.	34	1.01	2	.19	36	.82	3	39	.89
12. Diseases of Ears - -	35	1.04	—	—	35	.80	4	39	.89
13. Deafness - - -	67	2.00	3	.29	70	1.60	10	80	1.83
14. Impediment of Speech	45	1.34	2	.19	47	1.07	10	57	1.30
15. Disease of Heart -	763	22.77	164	15.93	927	21.16	116	1,043	23.81
16. Disease of Arteries (Aneurism).	15	.45	1	.10	16	.37	1	17	.39
17. Diseases of Veins (Var- ix).	677	20.21	144	13.98	821	18.74	55	876	20.00
18. Diseases of Lungs (not Phthisis).	128	3.82	12	1.16	140	3.20	20	160	3.65
19. Loss or Decay of Teeth	313	9.34	33	3.20	346	7.90	45	391	8.93
20. Hernia - - -	364	10.86	126	12.24	490	11.19	34	524	11.96
21. Laxity of Abdominal Rings.	175	5.23	17	1.65	192	4.38	7	199	4.54
22. Hemorrhoids - - -	141	4.21	13	1.26	154	3.52	18	172	3.93
23. Diseases of Urinary Organs.	32	.95	7	.68	39	.89	3	42	.96
24. Varicocele - - -	464	13.85	147	14.23	611	13.95	65	676	15.43
25. Diseases of Genital Or- gans (not Syphilitic).	81	2.51	14	1.36	95	2.21	6	104	2.37
26. Defects of Upper Ex- tremities, from Frac- ture, Contraction, Luxation, &c.	275	8.21	31	3.01	306	6.99	35	341	7.79
27. Defects of Lower Ex- tremities, from Frac- ture, Contraction, Luxation, &c.	423	12.62	39	3.79	462	10.55	91	553	12.63
28. Flat Feet - - -	168	5.01	34	3.30	202	4.61	30	232	5.30
29. Diseases of Joints -	66	1.97	13	1.26	79	1.80	6	85	1.94
30. Other Affections of Bones and Muscles.	100	2.98	10	.98	110	2.51	9	119	2.72
31. Ulcers, Wounds, and Cicatrices.	255	7.61	23	2.23	278	6.35	24	302	6.89
32. Other Affections of the Cutaneous System.	180	5.37	53	5.15	233	5.32	18	251	5.73
33. Malformation of Ears -	3	.09	—	—	3	.07	1	4	.09
34. Malformation of Nose and Mouth.	4	.12	1	.10	5	.11	—	5	.11
35. Malformation of Chest and Spine.	345	10.30	90	8.74	435	9.93	42	477	10.89
36. Malformation of Urinary or Genital Organs.	18	.54	—	—	18	.41	3	21	.48
37. Marks of Punishment, or letters D. or B.C.	19	.57	—	—	19	.43	—	19	.43
38. Marks of Cupping, Blis- tering, &c.	66	1.97	7	.68	73	1.67	16	89	2.03
Total Rejected	9,998	298.39	1,642	159.46	11,640	265.74	1,197	12,837	293.06

Syphilis, muscular tenuity and debility, defective vision, diseases of the heart, diseases of the veins, hernia, varicocele, defects of the lower extremities, and malformation of the chest and spine, were the principal causes for rejection. There was a large increase in the ratios of rejections for defective vision,



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diseases of the heart, hernia, defects of the lower extremities, other general diseases, and other affections of bones and muscles; and a slight decrease in those for impaired constitution, muscular tenuity and debility, diseases of the nervous system, weak intellect, deafness, impediment of speech, other diseases of the genital organs than syphilis, defects of the upper extremities, diseases of joints, malformation of the nose and mouth, malformation of the chest and spine, and marks of treatment. The remaining classes all show a slight increase when compared with the results of last year.

*Ages, Heights, and Weights of Recruits.*

Table showing the ages of all recruits, as given at their primary inspection, and the proportion per 10,000 at each age:—

Ages.	Numbers Inspected.			Proportion in 10,000.		
	By Army Medical Officers.	By Civil Medical Practitioners.	Total.	Examined by Army Medical Officers.	Examined by Civil Medical Practitioners.	Total.
Boys under 17 -	656	22	685	196	28	156
From 17 to 18 -	884	57	941	264	55	215
" 18 to 19 -	8,263	2,499	10,762	2,466	2,427	2,457
" 19 to 20 -	6,610	2,004	8,614	1,973	1,946	1,967
" 20 to 21 -	4,181	1,481	5,662	1,248	1,438	1,293
" 21 to 22 -	3,280	1,194	4,474	979	1,160	1,021
" 22 to 23 -	2,946	927	3,873	879	900	884
" 23 to 24 -	2,540	754	3,294	758	732	752
" 24 to 25 -	2,914	1,018	3,932	870	989	898
25 and upwards -	1,232	334	1,566	367	325	357
Total -	33,506	10,297	43,803	10,000	10,000	10,000

The proportion of recruits at each of the following ages, under 17 years, from 18 to 19, 19 to 20, and 25 years and upwards is lower, and at the remaining ages higher than last year. Owing to the General Order (dated 1st March) reducing the age of recruits to under 25 years, there is a very considerable diminution in the proportion above that age. There were fewer recruits by 203 per 10,000 under 20 years of age than in 1876.

Table showing the heights of all recruits, taken at their primary inspection, and the proportion per 10,000 at each height:—

Heights.				Numbers Inspected.			Proportion in 10,000.		
				By Army Medical Officers.	By Civil Medical Practitioners.	Total.	Examined by Army Medical Officers.	Examined by Civil Medical Practitioners.	Total.
ft.	in.	ft.	in.						
Under	5	3	-	622	23	645	186	22	147
5	3 to 5	4	-	330	11	341	98	11	78
5	4 to 5	5	-	5,494	1,220	6,714	1,640	1,185	1,533
5	5 to 5	6	-	8,127	2,588	10,715	2,426	2,504	2,446
5	6 to 5	7	-	6,925	2,193	9,118	2,067	2,130	2,082
5	7 to 5	8	-	5,614	1,804	7,418	1,675	1,752	1,693
5	8 to 5	9	-	3,153	1,234	4,387	941	1,198	1,001
5	9 to 5	10	-	1,733	751	2,484	517	729	567
5	10 to 5	11	-	838	291	1,129	250	283	258
5	11 to 6	0	-	400	133	533	119	129	122
6	0 and upwards			270	49	319	81	47	73
Total	-			33,506	10,297	43,803	10,000	10,000	10,000

When compared with the Table for 1876 containing this information, a considerable decrease is observed in the proportion of recruits at the following heights, under 5 ft. 3 in., between 5 ft. 5 in. and 5 ft. 6 in., and 5 ft. 7 in. and 5 ft. 8 in.; above 6 ft. the proportion is identical, and at each of the other heights it is greater; the largest increase occurring between 5 ft. 4 in. and 5 ft. 5 in. There were 59 per 10,000 more recruits measuring upwards of 5 ft. 6 in. than last year.

Table showing the weights of recruits inspected by Army Medical Officers, and the proportion per 10,000 at each weight. There is no information of this kind available respecting those primarily inspected by Civil Medical Practitioners, or by Army Medical Officers at many of the smaller stations.

Weights.	Numbers Weighed.	Proportion per 10,000.
Under 100 lbs.	410	194
100 lbs. to 110 lbs.	206	98
110 " to 120 "	2,398	1,136
120 " to 130 "	5,920	2,804
130 " to 140 "	5,857	2,775
140 " to 150 "	3,769	1,785
150 " to 160 "	1,590	753
160 " to 170 "	667	316
170 " and upwards	293	139
Total -	21,110	10,000

A larger proportion of recruits weighed under 130 lbs. than in 1876 by 61 per 10,000. The increase occurs entirely among those weighing between 120 lbs. and 130 lbs., there being a considerable decrease at the other weights. Of the recruits weighing more than 130 lbs. there is a considerable falling off, in the proportion between 130 lbs. and 140 lbs., a large increase between 160 lbs. and 170 lbs., and no material difference at the other weights.

ABSTRACTS compiled from the RECRUITING RETURNS for the last four years (1874 to 1877), showing the relative weight and height of recruits to age.

Table showing the weights and ages of recruits in proportions of 10,000 at each age:—

	Under 100 lbs.	From 100 lbs. to 110 lbs.	From 110 lbs. to 120 lbs.	From 120 lbs. to 130 lbs.	From 130 lbs. to 140 lbs.	From 140 lbs. to 150 lbs.	From 150 lbs. to 160 lbs.	From 160 lbs. to 170 lbs.	Upwards of 170 lbs.	Total.	Total of each age.
Boys under 17 years	8,543	914	372	140	26	5	—	—	—	10,000	1,936
Between 17 and 18	83	390	2,707	3,964	1,839	757	192	52	6	10,000	1,718
Between 18 and 19	1	114	2,133	3,608	2,587	1,102	331	86	32	10,000	17,271
Between 19 and 20	1	66	1,190	3,389	3,135	1,529	402	142	56	10,000	15,632
Between 20 and 21	—	44	821	2,641	3,209	2,045	832	274	134	10,000	9,123
Between 21 and 22	—	31	554	2,428	3,043	2,331	1,005	391	217	10,000	6,805
Between 22 and 23	—	28	452	2,006	3,182	2,533	1,100	490	209	10,000	5,792
Between 23 and 24	2	19	382	1,864	3,023	2,679	1,275	531	235	10,000	4,763
Between 24 and 25	2	23	431	1,629	2,890	2,750	1,344	662	269	10,000	5,090
25 and upwards	—	73	577	1,711	2,749	2,626	1,223	680	361	10,000	2,601
Total per 10,000 at each weight	237	93	1,134	2,774	2,850	1,796	716	275	125	10,000	—
Total at each weight	1,674	661	8,020	19,623	20,158	12,702	5,063	1,947	883	—	70,731

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Kingdom.*

The above Table compiled from the Annual Returns of Recruits rendered to the Army Medical Department for the last four years, and calculated on 70,731 observations, gives, at their acknowledged ages at the time of enlistment, in proportions of 10,000 at each age, the relative weight and height to age of all recruits whose weights were recorded during that period.

It seems hardly necessary here to remark that there are no means of ascertaining accurately the ages of recruits, and it is notorious that, owing to the restrictions as regards age, a very large proportion of youths, through fear of rejection, attempt to pass themselves off as older, and a smaller number of men, on the other hand, strive to make it appear that they are younger than is actually the case. Weight being considered as *one* of the tests of age, this table is framed for the purpose of assisting the examining Medical Officer, whose opinion, as to age, is now considered final (G. O. March 1878), in determining more accurately the age and eligibility of recruits for military service. It is, however, necessarily incomplete from giving the weights only in "ranges" of 10 lbs., from including in one class (owing to their comparative small numbers) all lads under 17 years, and from the omission of the heights of the recruits in conjunction with their ages and weights. (A separate Table of ages and heights is, however, given below): Boys under 17 years of age are enlisted only as drummers or musicians, and as by far the larger portions of these are under 15 years (between 14 and 15), their weight cannot be expected, save in a very few instances to exceed 100 lbs. Nearly three-fourths of the youths between 17 and 18 years weigh under 130 lbs., and one-tenth only, at this age, turn the scale at 140 lbs. The most important age in recruiting is the period between 18 and 20 years. In round numbers half the recruits examined are, or rather state they are, from 18 to 20 years of age. Of this large proportion, one-sixth weigh under 120 lbs., nearly two-thirds between 120 and 140 lbs., and more than three-fourths under 140 lbs. The custom, at present, is to reject all recruits under 120 lbs. in weight; it is, however, a question whether promising lads weighing from 117 lbs. to 120 lbs., if not over 20 years, should not be considered fit, provided that they are, in all other respects, eligible? A few days of good feeding will bring the majority of these up to the standard weight, viz., 120 lbs., but no recruit should be passed if, at 20 years of age, he does not turn the scale at 120 lbs. From 20 years of age and upwards, with few exceptions, there is a gradual increase of weight with age; a larger proportion of recruits, however, weigh between 130 to 140 lbs. at 22 years than at 21, and at upwards of 25 years we have a larger proportion weighing under 130 lbs. than between 24 and 25. The falling off of weight at this age is probably due to a larger number of elderly men, with broken down constitutions, attempting to pass themselves off as some years younger than they really are, for on comparing this Table with the Table of heights and ages it will be observed that the proportion of men measuring above 5 ft. 6 in. is greater at upwards of 25, than between 24 and 25 years.

On examining the totals, a little over one-seventh of the recruits are found to weigh under 120 lbs., a trifle less than three-sevenths weigh under 130 lbs., rather less than four-sevenths weigh between 120 and 140 lbs., and a little more than two-sevenths weigh over 140 lbs. The "range" at which we have the highest proportion of recruits is that between 130 and 140 lbs., and the lowest between 100 and 110 lbs.

Table showing the heights and ages of recruits in proportions of 10,000 at each age :— *United Kingdom.*

	Under 5 ft. 3 in.	5 ft. 3 in. to 5 ft. 4 in.	5 ft. 4 in. to 5 ft. 5 in.	5 ft. 5 in. to 5 ft. 6 in.	5 ft. 6 in. to 5 ft. 7 in.	5 ft. 7 in. to 5 ft. 8 in.	5 ft. 8 in. to 5 ft. 9 in.	5 ft. 9 in. to 5 ft. 10 in.	5 ft. 10 in. to 5 ft. 11 in.	5 ft. 11 in. to 6 ft.	6 ft. and upwards.	Total of each age.	Totals at each age.
Boys under 17 years.	9,074	510	206	138	43	14	—	4	4	—	7	10,000	2,764
Between 17 and 18.	145	384	2,672	3,285	1,817	1,185	283	111	61	44	13	10,000	2,971
Between 18 and 19.	5	65	1,665	3,175	2,298	1,604	709	295	108	48	28	10,000	27,515
Between 19 and 20.	4	86	1,911	2,814	2,143	1,610	750	396	166	71	49	10,000	23,137
Between 20 and 21.	2	49	1,366	2,454	2,029	1,911	1,077	619	277	133	83	10,000	14,030
Between 21 and 22.	4	37	1,082	2,243	1,992	1,962	1,348	706	322	168	136	10,000	10,497
Between 22 and 23.	2	47	1,180	2,118	2,021	1,916	1,277	761	357	185	136	10,000	8,816
Between 23 and 24.	3	44	1,063	2,147	1,974	1,947	1,349	734	422	208	109	10,000	7,318
Between 24 and 25.	3	31	992	2,106	2,047	1,805	1,326	885	471	184	150	10,000	7,475
25 and upwards.	12	30	814	2,129	2,078	1,764	1,392	960	466	197	158	10,000	4,053
Total per 10,000 at each height	239	78	1,455	2,573	2,060	1,696	954	518	239	111	77	10,000	—
Total at each height	2,593	848	15,796	27,934	22,370	18,412	10,364	5,630	2,591	1,206	832	—	108,576

This Table requires little further comment than a statement that it is printed for comparison with the preceding. It is compiled from the Annual Returns of the same four years, but gives the relative height to age of *all* recruits (108,576 in number) primarily inspected, during that period, by Army Medical Officers, and includes *all* whose weights are given in the previous Table. It would have been more satisfactory to have given the relative height to age of those only who were weighed, but in the present instance it was found impossible to separate the weighed from the unweighed. It will be observed that with little exception the height of recruits increases with age. The increase is of course less marked at the higher ages than at the lower, the proportion, however, measuring under 5 ft. 7 in. is 10 per 10,000 higher between 22 and 23 years than between 21 and 22. A large majority of recruits (nearly five-eighths) measure under 5 ft. 7 in.

### III.—ON THE HEALTH OF THE TROOPS SERVING IN THE MEDITERRANEAN.

#### Section I.—Sickness and Mortality.

#### I.—GIBRALTAR.

#### STATISTICAL REPORT.

#### Gibraltar.

The average annual strength of the force was 4,677 (non-commissioned officers and men); the admissions into hospital were 3,102; the deaths, including those of invalids who died after arrival in England, were 38; the average number of constantly sick was 185; the rate of admissions is therefore 663·3, that of deaths is 8·13, that of constantly sick is 39·55 per 1,000 of the strength. The admission rate is 1·1 per 1,000 men lower than in 1876; the death rate is ·46 per 1,000 higher; the constantly sick rate is 2·15 per 1,000 higher.

The corps which served at Gibraltar in the year, and some of the most important of their health statistics, are shown in the following table:—

Corps.	Completed Years of Service in the Command.	Average Annual Strength.	Admissions into Hospital.	Died.			Invalids sent Home.	Average Number constantly Sick.	Ratio per 1,000 of the Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.
				At Gibraltar.	Invalids.	Total.			Admissions.	Deaths.	Invalids.	Constantly Sick.		
Royal Artillery	3	969	663	7	2	9	25	53·0	684·2	9·25	25·80	54·70	19·96	29·18
Royal Engineers.	—	350	236	3	—	3	2	12·86	674·3	8·54	5·71	36·74	13·40	19·89
1st battalion 4th Foot.	3	653	310	—	1	1	15	17·74	474·7	1·53	22·97	27·17	9·92	20·92
2nd battalion 23rd Foot.	3	640	458	5	—	5	9	27·92	715·1	7·81	14·01	43·62	15·92	22·25
69th Foot	4	640	466	2	2	4	17	21·71	728·1	6·25	26·56	33·92	12·38	17·00
102nd Foot	1	654	482	7	4	11	19	26·84	737·0	16·82	29·05	41·04	14·98	20·33
2nd battalion Rifle Brigade.	3	655	389	3	—	3	6	17·31	593·9	4·58	9·16	26·43	9·65	16·25
Army Service Corps.	—	59	37	1	1	2	2	3·13	844·8	17·24	34·48	65·69	23·99	28·45
Army Hospital Corps.	—	49	60	—	—	—	2	4·33						
Staff, &c.	—	8	1	—	—	—	—	·16						

The least favourable results as regards health are those of the Royal Artillery, and the 102nd Foot, the same Corps which in the preceding year were similarly unfortunate. As regards the Royal Artillery, it will be seen that on an average each man admitted into hospital remained there a month. The prevalence of fever was one of the principal causes which conducted to this lengthened average time in which cases of illness of men of the Royal Artillery were under treatment. The men of the 102nd suffered rather more from fevers and from rheumatism than the other corps in the garrison; nearly half of the deaths in this corps were from consumption.

The classes and orders of diseases by which the sickness and mortality of *Gibraltar*. the Command were caused, are shown in the following table:—

Orders.	Diseases.	1877. Average Annual Strength, 4,677.						1869-76.	
		Admitted into Hospital.	Deaths.			Annual Ratio per 1,000 of Strength.		Annual Ratio per 1,000 of Strength.	
			At Gibraltar.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	<b>I.—General Diseases.</b>								
1	Febrile Group -	483	9	—	9	103·3	1·92	95·0	1·53
2	Constitutional Group -	522	6	8	14	111·6	2·99	107·7	1·50
	<b>II.—Local Diseases.</b>								
	Diseases of the—								
1	Nervous System -	43	—	—	—	9·2	—	6·9	·22
2	Eye -	65	—	—	—	13·9	—	17·8	—
3	Ear -	28	—	—	—	6·0	—	3·8	—
4	Nose -	2	—	—	—	·4	—	·6	—
5	Circulatory System -	65	3	1	4	13·9	·86	10·7	1·05
6	Absorbent -	32	—	—	—	6·9	—	4·3	—
7	Ductless glands -	—	—	—	—	—	—	·1	—
8	Respiratory System -	242	2	—	2	51·7	·43	43·5	·75
9	Digestive -	420	1	1	2	89·8	·43	83·0	·17
10	Urinary -	233	1	—	1	49·8	·21	68·7	·31
11	Generative -	58	—	—	—	12·4	—	14·0	—
12	Organs of Locomotion -	26	—	—	—	5·6	—	5·0	·06
13	Cellular Tissue -	74	—	—	—	15·8	—	14·3	—
14	Cutaneous System -	147	—	—	—	31·4	—	58·7	—
	<b>III.—Conditions, &amp;c.</b>								
	Debility -	133	—	—	—	28·4	—	6·8	—
	<b>IV.—Poisons</b>	88	2	—	2	18·8	·43	8·0	·14
	<b>V.—Injuries.</b>								
2	Accidental -	431	4	—	4	92·2	·86	92·2	·44
3	Homicidal -	—	—	—	—	—	—	—	—
4	Self-inflicted -	1	—	—	—	·2	—	·2	·17
5	Judicial -	—	—	—	—	—	—	—	—
	<b>VI.—Surgical Operations</b>	4	—	—	—	·9	—	·1	·03
	No appreciable disease -	5	—	—	—	1·1	—	1·1	—
	<b>Total</b>	3,102	28	10	38	663·3	8·13	637·0	6·37
	Average of 10 years, } 1867-76 -	—	—	—	—	662·1	6·71	—	—

*General Diseases.*—The rate of admissions in this class is lower by 46·4 per 1,000 men than the corresponding rate of 1876; the decrease in the *febrile group* is 32·3, that in the *constitutional group* is 14·1 per 1,000. The rate of mortality of the first-named group is fractionally lower than that for the preceding year, whilst that of the last is fractionally higher.

The admissions and deaths from the principal diseases in this class are shown in the following table:—

*Gibraltar.*

Diseases.	1877.		Annual Ratio per 1,000 of the Strength.			
	Admitted.	Died.	1877.		1869-76.	
			Admitted.	Died.	Admitted.	Died.
<i>Febrile Group.</i>						
Eruptive Fevers -	2	—	4	—	2.4	.08
Continued „ -	385	6	82.3	1.28	74.4	1.22
Paroxysmal Fevers -	84	3	18.0	.64	13.6	.17
Cholera -	—	—	—	—	—	—
Influenza -	—	—	—	—	1.8	—
Erysipelas -	9	—	2.0	—	2.0	—
Other Diseases -	3	—	.6	—	.8	.06
Total of Febrile Group	483	9	103.3	1.92	95.0	1.53
<i>Constitutional Group.</i>						
Rheumatism -	271	1	57.9	.21	45.8	.06
Syphilis -	208	—	44.5	—	51.6	.03
Scrofula, Phthisis, &c. -	41	13	8.8	2.78	7.9	1.33
Scurvy and Purpura -	—	—	—	—	.1	—
Anæmia -	—	—	—	—	1.6	—
Other Diseases -	2	—	.4	—	.7	.08
Total of Constitutional Group.	522	14	111.6	2.99	107.7	1.50

*Eruptive Fevers.*—The admissions were for measles (1), for scarlet fever (1).

*Continued Fevers.*—The rate of prevalence of fevers of this nature is 30 per 1,000 men lower than that for the preceding year; the rate of mortality is the same.

*Enteric Fever.*—The admissions were 10 in number, but the deaths (6) to cases treated being 600 per 1,000, it seems probable that only the most severe cases of the disease have been returned.

*Simple Continued Fever and Febricula.*—For the first-named 21 admissions, and for the last-named 354 admissions, are returned. The remarks made in the report of the medical officer of the Royal Artillery suggest the inference that in some instances another form of fever than that usually known as simple continued fever was treated; he notes that in some cases there was a rapid coming on of cerebral disturbance, effusion of serum into the ventricles, and at the base of the brain, and in the spinal canal; that there were “glandular enlargements of the body,” and he apparently refers to the same when he notes that “in several cases purpuric spots appeared on the skin, especially that over the abdomen and thighs, like deep seated, partly obliterated ink stains, varying in size from half an inch, to a point scarcely discernible.”

*Paroxysmal Fevers.*—The rate of admissions is fractionally higher than in 1876; the rate of deaths is the same for both years. *Ague*, 2 admissions for this fever are returned; *remittent fever*, 82 admissions and 3 deaths are returned.

*Erysipelas.*—The rate of prevalence is fractionally lower than that for the preceding year.

*Rheumatism.*—The rate of prevalence is 7.3 per 1,000 men lower than in 1876; many of the admissions were those of men who had previously suffered from fever.

*Syphilis.*—The rate of admissions is 9.2 per 1,000 men lower than in the preceding year. Of the whole number of admissions for this disease the proportion of primary disease is 706.7, and that of secondary 293.3, per 1,000.

*Scrofula, Phthisis, &c.*—The rate of admissions exceeds that of the preceding year by 2.2 per 1,000 men; the rate of mortality is .86 per 1,000 men higher.

**LOCAL DISEASES.**—*Diseases of the Nervous System.*—The rate of admissions exceeds that of the preceding year by 4·7 per 1,000 men. The admissions for epilepsy (12) and for neuralgia (17) are many more in number than those for the same diseases in 1876.

*Diseases of the Eye.*—The rate of admissions exceeds that of the preceding year by 2 per 1,000 men; 49 of the admissions were for conjunctivitis, a disease more prevalent in the 69th, than in any other corps; in 7 instances the particular affection of the eye is not discriminated, the admissions being returned as due to impaired vision.

*Diseases of the Circulatory System.*—The rate of admissions is 5·4 per 1,000 men higher than in the preceding year, but the rate of mortality is 1·06 per 1,000 lower; 41 of the admissions, being nearly two-thirds of the whole number, were for palpitation, an affection most common in the Royal Artillery, and in the 2nd battalion of the 23rd Foot.

*Diseases of the Respiratory System.*—The rate of admissions exceeds that of the preceding year by 10·6 per 1,000 men, but the rate of deaths is lower by ·21 per 1,000.

*Diseases of the Digestive System.*—The rate of admissions is 2·5 per 1,000 men higher than in 1876. For tonsillitis there were 84 admissions, for dyspepsia 79, of which 27 were those of men of the 2nd battalion of the Rifle Brigade; of 41 admissions for colic, 10 were those of men of the same corps.

*Diseases of the Urinary System.*—The rate of admissions is 7 per 1,000 men higher than in 1876.

*Cutaneous System.*—The rate of admissions is 9·3 per 1,000 men lower than in the preceding year.

**CONDITIONS, &c.**—The rate of admissions exceeds that of the preceding year by 11·8 per 1,000 men, and it is more than fourfold greater than that of the average of seven years.

**POISONS.**—The rate of admissions exceeds that of the preceding year by 4·3 per 1,000 men; the admissions of men of the Royal Engineers for diseases in this class are double those of any other corps, the strength of the Royal Engineers being only about the half of that of an infantry battalion.

**INJURIES.**—*Accidental.*—The rate of admissions is almost the same as that of the preceding year; the deaths in this group were due to drowning (1), to fractures (3).

*Self-inflicted Injuries.*—The only admission in this group was for cut-throat.

#### Officers.

In an average annual strength of 159 officers, there were 140 attacks of illness, being in the rate of 880·5 per 1,000 of the strength; no death took place; 13 officers were invalided to England, being in the rate of 81·76 per 1,000. More than a third of the illnesses were from diseases of the febrile group; 10 of the officers invalided had suffered from fever, returned as remittent fever in 8 instances.

#### Women.

In an average annual strength of 420 wives of non-commissioned officers and men there were 154 attacks of illness, and 3 deaths (at Gibraltar), being in the rates of 366·7 and of 7·14 per 1,000 of the strength respectively; 41 of the illnesses were from diseases of the febrile group; in 7 the cause was abortion. The deaths were due to phthisis (1), to bronchitis (1), to uterine disease (1).

#### Children.

In an average annual strength of 904 children of non-commissioned officers and men there were 366 attacks of illness, and (in Gibraltar) 30 deaths, being in the rates of 404·9 and of 33·19 per 1,000 of the strength respectively. Compared with the preceding year there is a higher rate of prevalence of sickness, but a death-rate lower by 6·16 per 1,000. The illnesses were due to chicken-pox in 4 instances, to measles in 120, to small-pox in 2, to enteric fever in 6. The deaths were due to measles (1), to scarlet fever (1), to enteric fever (1), to febricula (1), to phthisis (1), to atrophy (1), to convulsions (6), to teething (4), to bronchitis (1), to pneumonia (1), to diarrhoea (10), to debility (2).



*Malta.*

## II.—MALTA.

## STATISTICAL REPORT.

Exclusive of the Royal Malta Fencible Artillery, the average annual strength of the non-commissioned officers and men serving in the Command was 5,556; the admissions into hospital were 4,933; the deaths, including those of 8 invalids, were 46; the average number of constantly sick was 255. The admissions are therefore in the rate of 896·9, the deaths in that of 8·28, and the constantly sick in that of 45·90 per 1,000 of the strength, respectively. The admission rate is 94·1 per 1,000 men higher than in the preceding year; the death rate is 2·07 per 1,000 lower; the constantly sick rate is 2·07 per 1,000 higher.

Certain of the most important of the health statistics of the corps which served in the Command in 1877, are shown in the following table:—

Corps.	Completed Years of Service in the Command.	Average Annual Strength.	Admitted into Hospital.	Died.			Invalids sent Home.	Average Number constantly sick.	Rate per 1,000 of Strength.				Average Sick-time to each Soldier.	Average duration of each case of Sickness.
				At Malta.	Of Invalids.	Total.			Admitted.	Died.	Invalids.	Constantly Sick.		
10th Brigade, Roy. Artillery.	4	959	616	8	4	12	20	39·71	642·1	12·50	20·90	41·41	Days. 15·01	Days. 23·53
Royal Engineers.	—	188	131	3	—	3	3	4·89	696·9	15·96	15·95	26·01	9·49	13·62
2nd Battalion, 2nd Foot.*	0	343	573	2	—	2	2	26·29	1670·3	5·83	5·83	76·65	27·97	16·75
2nd Battalion, 13th Foot.†	0	345	384	3	—	3	1	13·67	1113·0	8·72	2·90	54·11	19·75	17·73
27th Foot	1	755	868	3	1	4	11	41·37	1140·5	5·30	14·61	54·80	19·20	17·38
42nd "	3	718	575	4	1	5	17	30·44	800·8	6·96	23·66	42·40	15·48	19·31
71st "	4	720	832	3	—	3	14	36·95	1155·5	4·17	19·44	51·32	18·75	16·22
98th "	2	725	508	7	2	9	13	26·70	700·7	12·41	24·83	36·88	13·44	19·13
101st "	3	730	473	4	—	4	14	23·53	641·1	5·41	18·95	38·61	14·09	22·02
Departmental Corps, &c.	—	64	23	1	—	1	5	1·45	—	—	—	—	—	—

\* Arrived in the Command on 5th August 1877.

† " " " 6th " "

The sickness and deaths in each class and order of diseases are shown in *Malta*. the following table :—

Orders.	Diseases.	1877.—Average Annual Strength, 5,556.						1869-76.	
		Admitted into Hospital.	Deaths.			Annual Ratio per 1,000 of the Strength.		Annual Ratio per 1,000 of the Strength.	
			In Malta.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
I. General Diseases.									
1	Febrile Group -	905	12	—	12	162·9	2·16	177·6	2·65
2	Constitutional Group -	393	4	6	10	70·7	1·80	86·2	1·67
II. Local Diseases.									
Diseases of the—									
1	Nervous System -	86	2	1	3	15·5	·54	11·0	·50
2	Eye -	214	—	—	—	38·5	—	27·9	—
3	Ear -	86	—	—	—	15·5	—	4·8	—
4	Nose -	8	—	—	—	1·4	—	·6	—
5	Circulatory System -	109	3	1	4	19·6	·72	12·2	1·48
6	Absorbent „ -	36	—	—	—	6·5	—	4·9	—
7	Ductless Glands -	1	—	—	—	·2	—	·1	—
8	Respiratory System -	247	2	—	2	44·5	·36	42·7	·98
9	Digestive „ -	1,018	8	—	8	183·2	1·44	144·6	·90
10	Urinary „ -	255	1	—	1	45·9	·18	41·0	·13
11	Generative „ -	54	—	—	—	9·7	—	12·7	—
12	Organs of Locomotion -	32	—	—	—	5·8	—	5·4	·05
13	Cellular Tissue -	201	—	—	—	36·2	—	27·9	·08
14	Cutaneous System -	519	—	—	—	93·4	—	64·4	—
III. Conditions.									
	Debility -	84	—	—	—	15·1	—	10·2	—
IV. Poisons -									
		14	—	—	—	2·5	—	10·4	·26
V. Injuries.									
2	Accidental -	711	4	—	4	128·0	·72	104·6	·66
3	Homicidal -	—	—	—	—	—	—	·1	·04
4	Self-inflicted -	6	2	—	2	1·1	·36	} ·7	·30
5	Judicial -	—	—	—	—	—	—		
VI. Surgical Operations									
	No appreciable disease -	4	—	—	—	·7	—	1·2	—
	Total -	4,983	38	8	46	896·9	8·28	791·4	9·75
	Average of 10 years, 1867-76 -	—	—	—	—	805·9	12·26	—	—

**GENERAL DISEASES.**—The rate of prevalence of diseases in this class is 18· per 1,000 men lower than that for the preceding year; for the *febrile group*, however, there is an increase of 16· per 1,000, so that the whole of the reduction in the class occurs in the *constitutional group*. The rate of deaths for the class is lower than in 1876 by ·67 per 1,000 men. Concomitantly with a greater prevalence of febrile diseases, the mortality from them was lower than in the preceding year by 1·59 per 1,000 men; on the other

*Malta.*

hand, with a diminished prevalence, the mortality from diseases of a constitutional kind was higher by '92 per 1,000; but statistics of the comparative frequency in which death follows illnesses classed in the two groups of the class of general diseases must be received with caution, as a secondary effect of fever, is occasionally the phthisis, which swells the mortality of the group of constitutional diseases.

The admissions and deaths from the principal diseases in this class are shown in the following table:—

General Diseases.	1877.		Ratio per 1,000 of Strength.			
			1877.		1869-76.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
<i>Febrile.</i>						
Eruptive Fevers -	—	—	—	—	2·8	·32
Continued -	873	11	157·1	1·98	163·1	2·12
Paroxysmal Fevers -	23	—	4·1	—	7·3	·16
Influenza -	—	—	—	—	1·6	—
Erysipelas -	7	—	1·3	—	2·1	—
Other Diseases -	2	1	·4	·18	·7	·05
Total of Febrile Group	905	12	162·9	2·16	177·6	2·65
<i>Constitutional.</i>						
Rheumatism -	211	—	37·9	—	52·2	—
Syphilis -	139	—	25·0	—	22·7	—
Scrofula, Phthisis, &c. -	35	9	6·3	1·62	9·5	1·45
Scurvy and Purpura -	—	—	—	—	·3	·04
Anæmia -	6	—	1·1	—	·9	—
Other Diseases -	2	1	·4	·18	·6	·18
Total of Constitutional Group	393	10	70·7	1·80	86·2	1·67

*Eruptive Fevers.*—No admission from any fever of this nature took place during the year.

*Continued Fevers.*—The rate of admissions for fevers of this nature is 21· per 1,000 men higher than in 1876. *Enteric fever* caused 29 admissions and 9 deaths; the rate of deaths to cases treated is therefore 310·34. The disease was present nearly throughout the year, April and August being the only months in which no admissions for it are recorded; its greatest prevalence was in the last three months.

*Simple Continued Fever.*—The 209 admissions for this kind of fever are in the rate of 37·6 per 1,000 of the strength. Both of the deaths occurred in the same regiment, the 98th, and in both instances the men attacked had been released from the military prison a few days only previous to admission into hospital.

*Febricula.*—The admissions for this form of fever are in the rate of 114·3 per 1,000 of the strength.

*Paroxysmal Fevers.*—Of the admissions for fevers of this nature, 10 were for *ague*, and 13 for *remittent fever*.

*Erysipelas.*—The rate of admissions is little more than the half of that for the preceding year.

*Rheumatism.*—The rate of admissions is lower than in the preceding year by 20·9 per 1,000 men.

*Syphilis.*—The rate of admissions is lower, by 8·9 per 1,000 men, than that for 1876.

*Scrofula, Phthisis, &c.*—The rate of admissions is lower, by 1·4 per 1,000 *Malta* men, than in the preceding year; the death rate, however, is higher by ·74 per 1,000 men.

**LOCAL DISEASES.**—*Diseases of the Nervous System.*—The rate of admissions exceeds that of the preceding year by 1· per 1,000 men. The rate of deaths is fractionally lower. 35 of the admissions were for neuralgia, 18 were for epilepsy. The deaths were due to meningitis (1), apoplexy (1), paralysis (1).

*Diseases of the Eye.*—The rate of admissions exceeds that of the preceding year by 19·5 per 1,000 men, a two-fold increase; 178 of the admissions were for conjunctivitis, a disease which prevailed most in September and in October. The Principal Medical Officer attributes its origin to the heat and to the glare of the sun.

*Diseases of the Circulatory System.*—The rate of admissions exceeds that of the preceding year by 2·2 per 1,000 men; the rate of mortality is lower by ·82 per 1,000, or less than one half. 73 of the admissions were for palpitation.

*Diseases of the Respiratory System.*—The rate of admissions exceeds that of the preceding year by 5·7 per 1,000 men; the rate of mortality is less than one third of that for 1876.

*Diseases of the Digestive System.*—The rate of admissions exceeds that of the preceding year by 32·5 per 1,000 men; the rate of deaths is ·34 per 1,000 higher. A considerable proportion of the excess in the rate of admissions was contributed to by the prevalence of bowel affections amongst the men of the regiments sent to augment the garrison towards the end of the summer. Of the deaths, 5 were due to dysentery, and 2 to hepatitis.

*Diseases of the Urinary System.*—The rate of admissions exceeds that of the preceding year by 3·2 per 1,000 men.

*Cutaneous System.*—The rate of admissions is 28 per 1,000 men higher than in the preceding year. Five of the admissions were for mosquito bites.

**CONDITIONS, &c.**—The rate of admissions exceeds that of 1876 by 6·9 per 1,000 men.

**POISONS.**—The rate of admissions is 1·3 per 1,000 men lower than that for the preceding year.

**INJURIES.**—*Accidental.*—The rate of admissions is lower than that for the preceding year by 7·5 per 1,000 men; of the deaths, 1 was due to a multiple injury, 2 to fractures of the skull, and 1 to drowning.

*Self-inflicted.*—One of the deaths in this group was by poisoning with opium; the other was by hanging.

#### Officers.

In an annual average strength of 228 officers, there were 189 attacks of illness, and 1 death; 12 officers were invalided to England during the year; the rates given by these numbers are, for attacks of illness, 829·, for mortality 4·39, and for invaliding 52·63 per 1,000 of the strength, respectively.

Diseases of the *febrile group* caused 57 of the illnesses; hepatitis caused 6, in one of which the disease terminated in abscess. The death was from consumption.

#### Women.

In an annual average strength of 406 wives of non-commissioned officers and men, there were 319 attacks of illness, and (in *Malta*) 2 deaths, being in the rates of 785·7 and of 4·92 per 1,000 of the strength respectively.

The deaths were due to pneumonia (1), to peritonitis (1).

#### Children.

In an average annual strength of 778 children of non-commissioned officers and men, there were 578 attacks of illness, and (in *Malta*) 39 deaths, being in the rates of 742·9 and of 50·13 per 1,000 of the strength respectively. The death rate fractionally exceeds that of 1876. (It exceeds the death rate of persons of the same age for England, on an average of 10 years, by 22·91 per 1,000.)

*Malta.*

Sixteen of the attacks were from eruptive fevers. Tubercular diseases were of comparatively infrequent occurrence. Conjunctivitis caused 127 attacks. The deaths were due to simple continued fever (1), diphtheria (3), scarlet fever (2), meningitis (2), convulsions (7), croup (2), bronchitis (2), pneumonia (2), teething (5), enteritis (2), diarrhoea (6), congenital malformation (1), debility (4).

## ROYAL MALTA FENCIBLE ARTILLERY.

The average annual strength of the non-commissioned officers and men was 347; the admissions into hospital were 213; the deaths 2; the number of constantly sick 8·54. No men were invalided during the year. The rate of admissions is 613·8; that of deaths is 5·76; that of constantly sick is 16·83 per 1,000 of the strength, respectively. The admission rate is lower than in the preceding year by 147·3 per 1,000 men; the constantly sick rate is lower by 17·18 per 1,000.

The admissions and deaths in the different classes and orders of diseases are shown in the following table:—

Orders.	Average Annual Strength.	Royal Malta Fencible Artillery.					
		347.		Annual Ratio per 1,000 of Strength.			
				1877.		1869-76.	
	Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	<b>I.—General Diseases.</b>						
1	Febrile Group - - -	24	—	69·1	—	61·2	1·86
2	Constitutional Group - -	35	—	100·8	—	88·6	·81
	<b>II.—Local Diseases.</b>						
1	Nervous System - - -	—	—	—	—	10·6	·81
2	Eye - - -	18	—	51·9	—	123·1	—
3	Ear - - -	1	—	2·9	—	2·7	—
4	Nose - - -	1	—	2·9	—	·6	—
5	Circulatory System - -	8	1	23·1	2·88	6·5	·54
6	Absorbent " - - -	—	—	—	—	5·4	—
8	Respiratory " - - -	15	—	43·2	—	53·4	—
9	Digestive " - - -	27	—	77·8	—	158·0	1·86
10	Urinary " - - -	18	—	51·9	—	60·2	—
11	Generative " - - -	1	—	2·9	—	9·2	·27
12	Organs of Locomotion -	1	—	2·9	—	2·7	—
13	Cellular Tissue - - -	10	—	28·8	—	33·6	—
14	Cutaneous System - -	26	—	74·9	—	106·8	—
	<b>III.—Conditions.</b>						
	Debility - - -	—	—	—	—	1·9	—
	<b>IV.—Poisons - - -</b>	—	—	—	—	·8	—
	<b>V.—Injuries.</b>						
2	Accidental - - -	28	—	80·7	—	56·9	—
3	Homicidal - - -	—	—	—	—	·6	·27
4	Self-inflicted - - -	—	1	—	2·88	·3	—
	No appreciable disease -	—	—	—	—	·6	—
	<b>Total - - -</b>	<b>213</b>	<b>2</b>	<b>613·8</b>	<b>5·76</b>	<b>783·7</b>	<b>5·42</b>
	<b>Average of 10 years, 1867-76</b>	—	—	769·0	6·15	—	—

**GENERAL DISEASES.**—The rate of admissions is lower than that for the preceding year by 42·9 per 1,000 men; the whole of the reduction being in the rate of the diseases of the *constitutional group*.

**Febrile Group.**—All the admissions, excepting two, were for febricula, and the medical officer of the regiment states that they were illnesses due to the effect of cold on men when overheated.

**Paroxysmal Fevers.**—Two admissions only for fevers of this nature took place; one for *ague*, was a recurrence of the disease in the instance of a man who had originally acquired it in India; the other was an admission for *remittent fever*, which is stated to have been of a severe nature.

**Constitutional Group.—Rheumatism.**—The rate of admissions is 54·7 per 1,000 men. In one instance muscular rheumatism followed on an attack of febricula, and continued for two months, in spite of active and intelligently used treatment.

**Syphilis.**—The rate of admissions is 34·6 per 1,000 men.

**Diseases of the Eye.**—The rate of admissions is 21·8 per 1,000 men lower than that for the preceding year. All the admissions, excepting one, were for conjunctivitis; the medical officer in adverting to the satisfactory diminution in the amount of this disease, one always hitherto a source of (relatively) considerable ineffectiveness in the regiment, attributes it chiefly to the salutary effect of the frequent and systematic inspections made for its detection.

**Diseases of the Circulatory System.**—The rate of admissions exceeds that of the preceding year by 2·5 per 1,000 men. Five of the admissions were for palpitation; the death was from fatty degeneration of the heart.

**Diseases of the Digestive System.**—The rate of admissions is lower than that for the preceding year by 13·6 per 1,000 men.

**Diseases of the Urinary System.**—The rate of admissions is lower than that for 1876, by 16 per 1,000 men; of the admissions returned for gonorrhoea, more than half were those of men readmitted for the same attack.

**INJURIES.—Accidental.**—The rate of admissions is lower than that for the preceding year by 13·7 per 1,000 men; one-third of the admissions was for blisters of the feet.

**Self-inflicted.**—The death in this group was from multiple injury.

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## Section II.

### *On the extent of Invaliding among the Troops serving in the Mediterranean.*

Ninety-seven non-commissioned officers and men were invalided from *Mediterranean*. Gibraltar, and 105 from Malta, being in the rate of 20·74 for the first, and of 18·90 per 1,000 for the last named Command. 59 invalids from Gibraltar (being 12·61 per 1,000 of the strength) were finally discharged the service during the year: 79 invalids from Malta (being 14·22 per 1,000 of the strength) were finally discharged during the year.

*Mediterranean.* The classes and orders of diseases to which the invaliding was due, are shown in the following table:—

Orders.	Diseases.	Invalids sent Home from			Invalids discharged at Netley, &c. from		
		Gibraltar.	Malta.	Total.	Gibraltar.	Malta.	Total.
	<b>I.—General Diseases.</b>						
1	Febrile Group - - -	4	18	22	—	—	—
2	Constitutional Group - -	29	19	48	21	18	39
	<b>II.—Local Diseases.</b>						
	Diseases of the—						
1	Nervous System - - -	6	—	6	4	8	12
2	Eye - - - - -	2	5	7	2	3	5
3	Ear - - - - -	2	4	6	2	3	5
5	Circulatory System - -	6	16	22	6	19	25
7	Ductless Glands - - -	—	1	1	—	1	1
8	Respiratory System - -	6	2	8	2	2	4
9	Digestive " - - - -	2	5	7	3	3	6
10	Urinary " - - - - -	2	7	9	1	4	5
11	Generative " - - - -	—	—	—	—	1	1
12	Organs of Locomotion -	3	4	7	3	3	6
13	Cellular Tissue - - -	1	—	1	—	—	—
14	Cutaneous System - -	—	3	3	—	—	—
	<b>III.—Conditions, &amp;c.</b>						
	Debility - - - - -	33	15	48	14	9	23
	<b>V.—Injuries.</b>						
2	Accidental - - - - -	—	6	6	1	5	6
4	Self-inflicted - - - -	—	—	—	—	—	—
	<b>VI.—Surgical Operations</b>	1	—	1	—	—	—
	<b>Total</b> - - - - -	97	105	202	59	79	138
	Ratio per 1,000 of { 1877 - 20·74 18·90 19·73 12·61 14·22 13·49 mean strength - { 1867-76 - 25·90 26·17 26·04 16·09 16·86 16·48						

Compared with the results of the preceding year, there is an increase of 12·43 per 1,000 men in the rate of primary invaliding for Gibraltar, and of 7·07 per 1,000 in the rate of final invaliding, the increase in both instances is greatest in diseases of the *constitutional group*, and in the condition, *debility*, and the loss to the force was mainly due to the prevalence of fever, the after effects of which, rheumatism, phthisis, weakness, have greatly raised the amount of invaliding.

The rate of primary invaliding for Malta is 2·03 per 1,000 men lower than in the preceding year, but the rate of final invaliding is 1·42 per 1,000 higher.

## Section III.

*Mediterranean.**Mean Daily Sick.*

The average number of constantly sick amongst the non-commissioned officers and men in Gibraltar was 185, and in Malta 255, being in the annual rates of 39·55, and of 45·90 per 1,000 of the strengths respectively.

The usual information calculated from these numbers is given in the following table :—

	Gibraltar.	Malta (exclusive of the Royal Malta Fencible Artillery).
Average strength in 1877 - - - -	4,677	5,556
Average constantly sick - - - -	185	255
Ratio per 1,000 constantly sick { 1877 - - - -	39·55	45·90
{ 1867-76 - - - -	38·68	40·57
	days.	days.
Average sick time to each soldier { 1877 - - - -	14·44	16·75
{ 1867-76 - - - -	12·30	14·81
Average duration of each case of sickness { 1877 - - - -	21·77	18·68
{ 1867-76 - - - -	18·57	18·30

For Gibraltar, all the results are unfavourable as compared with those of the preceding year ; the number of constantly sick is higher by 2·15 per 1,000 men, the average sick time to each soldier is longer by ·79, and the average duration of each case of sickness is longer by 1·29 days. For Malta, the rate of constantly sick is higher by 2·07, the average sick time to each soldier is fractionally higher, but the average duration of each case of sickness is 1·25 per 1,000 shorter.

## Section IV.

*Influence of Age in relation to Mortality.*

The relation of age (in quinquennial periods) to mortality, in the troops in the Mediterranean Commands, is shown in the following table :—

	Under 20.	20 and under 25.	25 and under 30.	30 and under 35.	35 and under 40.	40 and upwards.
Mediterranean Commands :						
1877 { Average strength - - -	808	4,041	2,806	873	1,094	332
{ Died - - - - -	4	31	19	8	14	3
{ Ratio per 1,000 of strength - - -	4·95	7·67	6·77	9·16	12·80	9·06
1866-76 Do. Do. - - -	2·43	6·44	9·54	11·91	16·22	25·15



#### IV.—ON THE HEALTH OF THE TROOPS SERVING IN THE DOMINION OF CANADA:

##### Section I.

##### *Sickness and Mortality.*

##### STATISTICAL REPORT.

##### *Dominion of Canada.*

THE average annual strength of the non-commissioned officers and men was 1,705; the admissions into hospital were 951; the deaths in the Command, with that of an invalid, were 10; the average number of constantly sick was 52·74. The proportions given by these numbers are, for admissions 557·8, for deaths 5·87, and for constantly sick 30·93 per 1,000 of the strength, respectively. Compared with the preceding year, the rate of admissions is 58·1 per 1,000 men lower, the rate of deaths is 1·32 per 1,000 higher, and the rate of constantly sick is 1·53 per 1,000 higher.

Certain particulars of the results of sickness in each of the corps serving in the Command are shown in the following table:—

Corps.	Average Annual Strength.	Admitted into Hospital.	Died.	Invalided.	Average Number constantly Sick.	Ratio per 1,000 of the Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.
						Admitted.	Died.	Invalided.	Constantly Sick.		
Royal Artillery	314	153	4	8	9·71	487·2	12·74	25·48	30·93	11·29	23·16
Royal Engineers	110	68	1	3	2·87	618·2	9·09	27·27	26·09	9·52	15·41
1st Battalion, 20th Foot	635	371	4	7	22·94	534·3	6·30	11·02	36·13	13·19	23·53
97th Foot	616	358	1	8	17·19	531·2	1·63	12·99	27·91	10·17	17·50
Departmental Corps	30	1	—	—	·03	—	—	—	—	—	—

The admissions and deaths in the various classes and orders of diseases are shown in the following table:— *Dominion of Canada.*

Orders.	Diseases.	Strength, 1,705.				1877.		1869-76.	
		Admissions.	Deaths.			Annual Ratio per 1,000.		Annual Ratio per 1,000.	
			In Canada.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
I.—General Diseases.									
1	Febrile Group -	14	1	—	1	8.2	.59	38.0	.49
2	Constitutional Group -	165	3	—	3	96.8	1.75	104.0	1.27
II.—Local Diseases.									
1	Nervous System -	17	—	—	—	10.0	—	9.8	.69
2	Eye -	20	—	—	—	11.7	—	14.0	—
3	Ear -	5	—	—	—	2.9	—	3.4	—
4	Nose -	—	—	—	—	—	—	.7	—
5	Circulatory System -	10	2	—	2	5.8	1.17	9.2	1.27
6	Absorbent -	23	—	—	—	13.5	—	14.5	—
8	Respiratory -	89	1	—	1	52.2	.59	75.6	1.76
9	Digestive -	208	—	—	—	122.0	—	85.5	.41
10	Urinary -	92	1	—	1	54.0	.59	69.6	.25
11	Generative -	27	—	—	—	15.8	—	9.5	—
12	Organs of Locomotion -	8	—	—	—	4.7	—	4.4	.08
13	Cellular Tissue -	48	—	—	—	28.2	—	20.0	.04
14	Cutaneous System -	55	—	—	—	32.3	—	51.5	.04
III.—Conditions, &c.									
	Debility -	3	—	—	—	1.8	—	3.9	—
IV.—Poisons.									
		21	—	—	—	12.3	—	8.8	.41
V.—Injuries.									
2	Accidental -	143	—	1	1	83.8	.59	90.3	.73
3	Homicidal -	—	—	—	—	—	—	.1	.12
4	Self-inflicted -	—	1	—	1	—	.59	.2	.45
VI.—Surgical Operations.									
	No appreciable disease -	3	—	—	—	1.8	—	.6	—
	Total -	951	9	1	10	557.8	5.87	613.9	8.05
	Average of 10 years, } 1867-76 -	—	—	—	—	640.3	9.04	—	—

**GENERAL DISEASES.**—The rate of admissions in this class exceeds that for the preceding year by 26.6 per 1,000 men, the whole of the increase being in the *constitutional group*. The death rate of the class is higher by 1.20 per 1,000 men.

The admissions and deaths from the principal diseases in the class are shown in the following table:—

Dominion of  
Canada.

Diseases.	Admitted.	Died.	Ratio per 1,000 of Strength.			
			1877.		1869-76.	
			Admitted.	Died.	Admitted.	Died.
<i>Febrile—</i>						
Eruptive Fevers - -	2	—	1·2	—	2·2	·04
Continued " - -	5	1	2·9	·59	16·4	·33
Paroxysmal Fevers -	3	—	1·7	—	4·3	—
Cholera - - - -	—	—	—	—	·1	—
Influenza - - - -	2	—	1·2	—	9·8	—
Erysipelas - - -	2	—	1·2	—	4·3	·08
Other Diseases - -	—	—	—	—	·9	·04
Total of Febrile Group	14	1	8·2	·59	38·0	·49
<i>Constitutional—</i>						
Rheumatism - - -	122	—	71·6	—	36·3	—
Syphilis - - - -	30	—	17·6	—	59·7	·04
Scrofula, Phthisis, &c. -	10	3	5·8	1·75	5·9	1·11
Scurvy and Purpura - -	1	—	·6	—	·5	—
Anæmia - - - -	1	—	·6	—	·5	—
Other Diseases - - -	1	—	·6	—	1·1	·12
Total of Constitutional } Group - - - - }	165	3	96·8	1·75	104·0	1·27

*Eruptive Fevers.*—The admissions in this group were for scarlet fever.

*Continued Fevers.*—Enteric fever caused one admission; the others were for febricula.

*Paroxysmal Fevers.*—One admission was due to *ague*; two were due to remittent fever.

*Rheumatism.*—The rate of admissions exceeds that of the preceding year by 43·8 per 1,000 men, being considerably more than a twofold increase.

*Syphilis.*—The rate of admissions is 1·1 per 1,000 men higher than in 1876.

*Scrofula, Phthisis, &c.*—Compared with the preceding year, there is for the present a fractional decrease in the rate of admissions, with a fractional increase in that of deaths.

**LOCAL DISEASES.**—*Diseases of the Nervous System.*—The rate of admissions is lower by 3·6 per 1,000 men than the corresponding rate of 1876. Eight of the admissions in this group were for epilepsy, and five were for mental disease.

*Diseases of the Eye.*—The rate of admissions is a little higher than that of the preceding year.

*Circulatory System.*—The rate of admissions is 12·9 per 1,000 men lower than in the preceding year; this reduction is due to the greatly decreased prevalence of palpitation in the present year.

*Respiratory System.*—The rate of admissions is 42·1 per 1,000 men lower than in 1876, and the rate of mortality is 1·11 per 1,000 men lower.

*Digestive System.*—The rate of admissions is 10·4 per 1,000 men lower than that for the preceding year; 98 of the admissions were for tonsillitis, and 50 were for dyspepsia; the six admissions for hepatitis were those of men who had previously served in Bermuda.

*Urinary System.*—The rate of admissions is 2·9 per 1,000 men higher than in 1876; the death in this group was due to Bright's Disease.

**POISONS.**—The rate of admissions is higher by 2·6 per 1,000 men than in 1876. The medical officer of the hospital remarks that the 21 admissions returned in this class by no means represents the amount of sickness caused

by intemperance; he states that chronic alcoholism was a very prevalent condition; that to its existence a large part of the admissions for dyspepsia was due, and its hurtful influence complicated the illnesses of many of the men admitted for accidents.

*Dominion of  
Canada.*

**INJURIES.—Accidental.**—The rate of admissions for accidental injuries is 19·6 per 1,000 men lower than in the preceding year; the death was from drowning. **Self-inflicted.**—The death in this order was by hanging.

#### *Officers.*

In an average annual strength of 88 commissioned officers there were 48 attacks of illness, being in the rate of 545·4 per 1,000 of the strength. No officer died during the year; one officer was invalided to England.

#### *Women.*

In an average annual strength of 148 wives of non-commissioned officers and men 35 attacks of illness are returned. One death occurred from child-birth.

#### *Children.*

In an average annual strength of 309 children of non-commissioned officers and men 43 attacks of illness are returned; the deaths were three (being in the rate of 9·70 per 1,000 of the strength); they were due to choleraic diarrhoea (1), fibrocellular tumour (1), diarrhoea (1).

### *Section II.*

#### *On the Extent of Invaliding.*

Twenty-five invalids were sent to England during the year, and 17 were finally discharged the service.

The rate of primary invaliding is 5·91 per 1,000 men lower than in 1876; that of final invaliding is 66.

The diseases which necessitated invaliding are shown in the following table:—

Disabilities.	Invalids sent Home from Canada.	Invalids discharged the Service.	
		In Canada.	At Netley, &c.
Rheumatism - - - - -	7	—	5
Syphilis - - - - -	2	—	1
Phthisis - - - - -	4	—	—
Paralysis - - - - -	1	—	1
Epilepsy - - - - -	2	—	1
Chorea - - - - -	—	—	1
Dementia - - - - -	3	—	—
Epistaxis - - - - -	—	—	1
Inflammation of glands - - - - -	1	—	1
Bronchitis - - - - -	—	—	1
Stricture of urethra - - - - -	1	—	1
Contraction of tendons - - - - -	—	—	1
Contraction of joint - - - - -	1	—	—
Ankylosis - - - - -	1	1	—
Ulcer - - - - -	1	—	—
Corns - - - - -	—	—	1
Debility - - - - -	—	—	1
Fracture - - - - -	1	—	—
Total - - - - -	25	1	16
Rate per 1,000 of strength { 1877 -	14·54	·59	9·38
{ 1867-76 -	17·45	2·50	11·09

## Section III.

*Mean Daily Sick.**Dominion of  
Canada.*

The average number of constantly sick during the year was 52·74, being in the rate of 30·93 per 1,000 of the strength, showing an increase of 1·53 per 1,000 on the rate of the preceding year.

The usual information calculated from these numbers is given in the following table :—

	1877.	1867-76.
Ratio per 1,000 of strength constantly sick - - -	30·93	30·21
Average sick time to each soldier - - -	Days. 11·29	Days. 11·02
Average duration of each case of sickness - - -	20·24	17·22

The average sick time to each soldier is fractionally higher than the corresponding rate for the previous year, whilst that of the average duration of each case of sickness is 3·24 per 1,000 higher.

## Section IV.

*On the Influence of Age on the Mortality.*

The death rates for the several ages (arranged in quinquennial periods) are shown in the following table :—

	Under 20 Years.	20 and under 25.	25 and under 30.	30 and under 35.	35 and under 40.	40 and upwards.
Average strength -	63	494	710	140	156	61
„ deaths -	—	4	1	1	1	2
Ratio of deaths { 1877 -	—	8·10	1·41	7·15	6·41	32·79
per 1,000 of the strength { 1867-76	4·00	4·68	7·61	11·93	16·04	26·68

# V.—ON THE HEALTH OF THE TROOPS SERVING IN BERMUDA.

## Section I.

### Sickness and Mortality.

#### STATISTICAL REPORT.

The average annual strength of the non-commissioned officers and men *Bermuda* was 1,874; the admissions into hospital were 1,179, the deaths were 9, the average number of constantly sick was 62·19. The rate of admissions is therefore 629·1, that of deaths is 4·79, and that of constantly sick is 33·19 per 1,000 of the strength, respectively. The admission rate is 26·3 per 1,000 men higher than that for the preceding year, the death rate is 2·97 per 1,000 lower, the constantly sick rate is 1·15 per 1,000 lower.

Some of the most important of the health statistics of the corps which composed the garrison, are shown in the following Table :—

Corps.	Completed Year of Service in the Command.	Average Annual Strength.	Admitted into Hospital.	Died.	Invalided Home.	Average Number of Constantly Sick.	Ratio per 1,000 of Strength.				Average Sick-time to each Soldier.	Average Duration of each Case of Sickness.	
							Admitted.	Died.	Invalided.	Constantly Sick.			
Royal Artillery	-	224	155	3	10	8·85	692·0	8·38	44·64	39·51	Days. 14·43	Days. 20·84	
„ Engineers	-	376	277	1	6	12·28	736·7	2·66	15·96	33·66	11·92	16·18	
1st Batt., 19th Foot*	-	87	94	-	-	2·76	1080·5	-	-	31·74	11·58	10·73	
46th Foot	-	1st	551	324	2	9	18·46	583·0	3·63	16·33	33·56	12·23	20·80
87th „	-	1st	570	301	3	9	17·32	528·1	5·26	15·80	30·39	11·09	21·03
Departmental Corps, and Details	-	66	28	1	3	2·52	-	-	-	-	-	-	

\* Arrived in the Command on the 18th of November.

† Left the Command on the 23rd of November.

*Bermuda.*

The admissions and deaths in the various classes and orders of diseases are shown in the following Table :—

Orders.	Diseases.	1877. Average Strength, 1,874.						1869-76.	
		Admitted into Hos- pital.	Deaths.			Annual Ratio per 1,000 of the Strength.		Annual Ratio per 1,000 of the Strength.	
			In Bermuda.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	<b>I.—General Diseases.</b>								
1	Febrile Group - -	77	1	—	1	41·1	·53	71·1	2·32
2	Constitutional Group -	113	1	1	2	60·3	1·07	78·0	2·05
	<b>II.—Local Diseases.</b>								
	<b>Diseases of the—</b>								
1	Nervous System - -	22	—	—	—	11·7	—	10·1	1·26
2	Eye - - - - -	48	—	—	—	25·6	—	20·2	—
3	Ear - - - - -	10	—	—	—	5·3	—	3·1	—
4	Nose - - - - -	1	—	—	—	·5	—	·3	—
5	Circulatory System -	28	—	—	—	15·0	—	9·3	1·66
6	Absorbent „ - - -	12	—	—	—	6·4	—	12·7	—
8	Respiratory System -	70	—	1	1	37·3	·53	37·0	·47
9	Digestive „ - - -	267	1	—	1	142·5	·53	157·8	·86
10	Urinary „ - - - -	54	—	—	—	28·9	—	29·0	·33
11	Generative „ - - -	10	—	—	—	5·3	—	8·3	—
12	Organs of Locomotion -	4	—	—	—	2·2	—	3·2	·06
13	Cellular Tissue - -	36	—	—	—	19·2	—	27·5	·06
14	Cutaneous System - -	121	—	—	—	64·6	—	64·4	·06
	<b>III.—Conditions, &amp;c.</b>								
	Debility - - - - -	30	—	—	—	16·0	—	7·8	—
	<b>IV.—Poisons.</b>	15	2	—	2	8·0	1·07	18·4	·54
	<b>V.—Injuries.</b>								
2	Accidental - - - -	259	1	—	1	138·2	·53	115·1	1·19
4	Self-inflicted - - -	1	1	—	1	·5	·53	·5	·86
	<b>Surgical Operations.</b>	—	—	—	—	—	—	·1	—
	No appreciable disease -	1	—	—	—	·5	—	·5	—
		1,179	7	2	9	629·1	4·79	674·4	11·72
	Average of 10 years, 1867-76 - - - - }	—	—	—	—	685·9	13·33	—	—

**GENERAL DISEASES.**—The admission rate for diseases in this class is less by 16·4 per 1,000 men than in the preceding year; for the *febrile group*, there is an increase of 9·6 per 1,000; the whole of the decrease is, therefore, in the *constitutional group* of diseases. The rate of deaths for the class is less than the half of that in 1876, and there is a reduction in the rate of each group.

The admissions and deaths from the principal diseases in this class are *Bermuda*. shown in the following Table :—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength.			
			1877.		1869-76.	
			Admitted.	Died.	Admitted.	Died.
<i>Febrile Group.</i>						
Eruptive Fevers - - -	—	—	—	—	·2	·06
Continued „ - - -	72	1	38·4	·53	60·9	2·20
Paroxysmal Fevers - - -	1	—	·5	—	1·2	—
Influenza - - -	4	—	2·2	—	8·1	—
Erysipelas - - -	—	—	—	—	·3	—
Other Diseases - - -	—	—	—	—	·3	·06
Total of Febrile Group -	77	1	41·1	·53	71·0	2·32
<i>Constitutional Group.</i>						
Rheumatism - - -	60	—	32·0	—	36·5	—
Syphilis - - -	39	—	20·8	—	31·1	·06
Scrofula, Phthisis, &c. -	11	2	5·9	1·07	8·8	1·79
Anæmia - - -	3	—	1·6	—	·9	—
Other Diseases - - -	—	—	—	—	·7	·20
Total of Constitutional Group	113	2	60·3	1·07	78·0	2·05

*Continued Fevers.*—*Enteric fever* caused 12 admissions ; 1 attack was fatal, the illnesses occurred in the summer, and in the autumn, and amongst men quartered both at St. George's and at Prospect. *Simple continued fever*, caused 7 admissions only. *Febricula.*—There were 53 admissions for this form of fever.

*Rheumatism.*—The rate of prevalence is 10·9 per 1,000 men lower than in the preceding year.

*Syphilis.*—The rate of prevalence is 11·2 per 1,000 men lower than in the preceding year.

*Scrofula, Phthisis, &c.*—The rate of admissions is 3·4 per 1,000 men lower than in the preceding year ; the death rate is fractionally higher.

**LOCAL DISEASES.**—*Diseases of the Nervous System.*—One-half of the admissions returned in this order were for neuralgia.

*Diseases of the Eye.*—The rate of admissions exceeds that of the preceding year by 7·5 per 1,000 men ; two-thirds of the admissions were for conjunctivitis.

*Diseases of the Circulatory System.*—The rate of admissions is nearly the same as in 1876, excepting 8 all were for palpitation.

*Diseases of the Respiratory System.*—The rate of admissions is lower by 8·2 per 1,000 men than in the preceding year ; the death was from pneumonia.

*Diseases of the Digestive System.*—The rate of admissions exceeds that of the preceding year by 26·7 per 1,000 men ; 109 of the admissions in this order were for dyspepsia ; there were 4 admissions for dysentery, and 91 for diarrhoea. The death was due to obstruction of the intestine.

*Diseases of the Urinary System.*—The rate of admissions exceeds that of the preceding year by 2· per 1,000 men.

**POISONS.**—The rate of admissions exceeds that of the preceding year by 1·8 per 1,000 men ; 13 of the admissions were for delirium tremens, and 2 for alcohol taken in a poisonous quantity ; both of the deaths were due to the last-named cause.



*Bermuda.*

**INJURIES.—Accidental.**—The rate of admissions is higher by 5·8 per 1,000 men than in the preceding year; the death was due to a multiple injury.

**Self-inflicted.**—The death in this group was by poisoning with the cyanide of potassium.

*Officers.*

In an annual average strength of 92 officers there were 39 attacks of illness and 1 death; 3 officers were invalided to England; the rates given by these numbers are, for attacks of illness 424, for the death 10·87, and for invaliding 32·61 per 1,000 of the strength respectively. The death was by gunshot, and was self-inflicted.

*Women.*

In an annual average strength of 206 wives of non-commissioned officers and men there were 44 attacks of illness and (in Bermuda) 2 deaths; 1 of the deaths was from pericarditis, the other was consequent on the puerperal state.

*Children.*

In an average annual strength of 388 children of non-commissioned officers and men, 67 attacks of illness are returned; the deaths (in Bermuda) were 15, being in the rate of 38·66 per 1,000 of the strength; this shows a reduction of 2·58 per 1,000 on the rate of 1876. The deaths were due to—*anæmia* (1), *meningitis* (1), *convulsions* (1), *teething* (3), *diarrhoea* (2), *debility* (6), *accident* (1).

*Section II.**On the Extent of Invaliding.*

Thirty-seven invalids were sent home, and 27 were finally discharged the service during the year.

The proportion of primary invaliding is 9·73 per 1,000 lower than in the preceding year, whilst that of final invaliding is 3·04 per 1,000 higher.

The classes and orders of diseases to which invaliding was due, are shown in the following Table:—

Class.	Order.	Diseases.	Invalids sent Home.	Discharged the Service at Home.
I.	2	Rheumatism - - - -	1	—
		Syphilis - - - -	1	—
		Phthisis - - - -	8	11
		Diseases of the—		
II.	1	Nervous System - - -	4	—
	2	Eye - - - -	2	1
	3	Ear - - - -	—	1
	5	Circulatory System - -	4	6
	8	Respiratory „ - - -	5	3
	9	Hepatitis - - - -	4	—
	12	Organs of Locomotion -	—	1
III.		Debility - - - -	7	4
V.	2	Injuries - - - -	1	—
		Total - - - -	37	27
		Ratio per 1,000 of the { 1877 - -	19·74	14·41
		Strength - - - { 1867-76 -	22·67	18·56

## Section III.

*Mean Daily Sick.*

The average number of non-commissioned officers and men constantly in *Bermuda* hospital during the year was 62·19.

Certain particulars calculated from the number of constantly sick are shown in the following Table :—

	1877.	1867-76.
Ratio per 1,000 of constantly sick - - - -	33·19	33·12
Average sick-time to each soldier - - - -	Days. 12·11	Days. 12·09
Average duration of each case of sickness - - - -	19·34	17·64

## Section IV.

*On the Influence of Age on the Mortality.*

The returns being incomplete, the information usually given in this section cannot be compiled.

## VI.—ON THE HEALTH OF THE TROOPS SERVING IN THE WEST INDIES.

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### Section I.

#### *Sickness and Mortality.*

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#### STATISTICAL REPORT.

##### I. WHITE TROOPS.

*West Indies  
Command.*

The annual average strength of non-commissioned officers and men was 1,133; the admissions into hospital were 1,108 in number; there were 18 deaths in the Command; and the average number of daily sick was 57·14; the rate of admissions is therefore 977·9, that of deaths 15·88, and that of daily sick 50·43 per 1,000 of the strength, respectively. The admission rate is in excess of that of the preceding year by 220·1 per 1,000 of the strength, the death rate by 12·20, and that of constantly sick by 8·99.

The troops in the Command consisted of the 18th Battery of the 9th Brigade, and the 5th Battery of the 10th Brigade, Royal Artillery, the 35th Regiment, detachments of Royal Engineers and Army Hospital Corps, Garrison Staff, Staff Sergeants of West Indian Regiments, and of the Military Labourers. The stations occupied were Barbadoes, Trinidad, and Jamaica.

The admissions and deaths in the various classes and orders of diseases are shown in the following Table:— *West Indies Command.*

Orders.	White Troops.	1877.						1869-76.	
		Strength, 1,183.				Ratio per 1,000.		Ratio per 1,000.	
		Admitted.	Died.			Admitted.	Died.	Admitted.	Died.
			In West Indies.	Of Invalids.	Total.				
	<b>I. General Diseases.</b>								
1	Febrile Group -	252	11	—	11	222·4	9·71	184·2	4·40
2	Constitutional Group -	161	—	—	—	142·1	—	104·9	1·96
	<b>II. Local Diseases.</b>								
1	Nervous System -	9	2	—	2	8·0	1·77	11·6	·88
2	Eye -	12	—	—	—	10·6	—	11·0	—
3	Ear -	6	—	—	—	5·3	—	8·0	—
4	Nose -	—	—	—	—	—	—	·4	—
5	Circulatory System -	11	1	—	1	9·7	·88	11·8	·98
6	Absorbent „ -	27	—	—	—	23·8	—	20·8	—
7	Ductless Glands -	—	—	—	—	—	—	·1	—
8	Respiratory System -	39	1	—	1	34·4	·88	32·5	·20
9	Digestive „ -	165	1	—	1	145·6	·88	125·3	·68
10	Urinary „ -	64	—	—	—	56·5	—	99·3	·09
11	Generative „ -	33	—	—	—	29·1	—	14·0	—
12	Organs of Locomotion -	10	—	—	—	8·8	—	5·4	—
13	Cellular Tissue -	38	—	—	—	33·6	—	25·8	—
14	Cutaneous System -	113	—	—	—	99·7	—	85·6	—
	<b>III. Conditions, &amp;c.</b>								
	Debility -	27	—	—	—	23·8	—	11·6	·09
	<b>IV. Poisons.</b>	5	—	—	—	4·4	—	18·1	·59
	<b>V. Injuries.</b>								
2	Accidental -	135	1	—	1	119·2	·88	121·8	·68
4	Self-inflicted -	—	1	—	1	—	·88	·8	·20
	<b>VI. Surgical Operations.</b>	1	—	—	—	·9	—	·2	—
	No appreciable disease -	—	—	—	—	—	—	1·0	—
	<b>Total -</b>	<b>1,108</b>	<b>18</b>	<b>—</b>	<b>18</b>	<b>977·9</b>	<b>15·88</b>	<b>893·2</b>	<b>10·75</b>
	<b>Average of 10 years, 1867-76 -</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>916·5</b>	<b>14·16</b>	<b>—</b>	<b>—</b>

GENERAL DISEASES show a considerably higher rate of admissions than in the previous year, and the death rate is also much in excess of that of 1876. The mortality, in this class, is confined to the *febrile group*, and is, with one exception, due to an outbreak of yellow fever in Jamaica.

West Indies  
Command.

White Troops.				1877.		1869-76.	
General Diseases.				Strength, 1,133.		Ratio per 1,000 of Strength.	
				Admitted.	Died.	Admitted.	Died.
<i>Febrile—</i>							
Eruptive Fevers	-	-	-	3	—	2.6	—
Continued „	-	-	-	198	—	170.3	—
Yellow „	-	-	-	11	10	9.7	8.83
Paroxysmal „	-	-	-	48	1	38.0	.88
Influenza	-	-	-	1	—	.9	—
Erysipelas	-	-	-	—	—	—	—
Other diseases	-	-	-	1	—	.9	—
Total of Febrile Group				252	11	222.4	9.71
• <i>Constitutional—</i>							
Rheumatism	-	-	-	31	—	27.3	—
Syphilis	-	-	-	116	—	102.4	—
Scrofula, Phthisis, &c.	-	-	-	12	—	10.6	—
Scurvy and Purpura	-	-	-	1	—	.9	—
Anæmia	-	-	-	1	—	.9	—
Other diseases	-	-	-	—	—	—	—
Total of Constitutional Group				161	—	142.1	—

*Eruptive Fevers* were confined to three cases of measles at Barbadoes.

*Enteric Fever.*—Two cases occurred at Jamaica and two at Trinidad.

*Simple Continued Fevers and Febricula* were much more prevalent than in 1876. The admissions were most numerous in August and September, during which months more than one-third of the cases occurred. There were no deaths.

*Yellow Fever.*—There were 11 admissions for this disease and 10 deaths. The origin of the epidemic amongst the civil population is not apparent. The first case reported among the troops was that of a sergeant of the Army Hospital Corps, living in lodgings in Kingston, where sporadic cases are supposed to have occurred among the civil population, who was taken suddenly ill on the 7th July, and, as the case seemed a serious one, he was removed to the Station Hospital, Up Park Camp, where he died, with symptoms of yellow fever, on the 12th. The next case recorded among the military was that of an officer of the Royal Artillery, who died at his residence in the hills, about 12 miles from Kingston, on the 21st October. This was followed by the first case at Newcastle, which occurred in November. The Principal Medical Officer reports: "At Newcastle the first case appeared "on the 12th November, in one of the huts, a double one, at the lower part "of the cantonment, occupied by the Royal Artillery. No other case presented itself until the 5th December, when another man, from a room "adjoining that which had furnished the first case, with a door of communication between the two rooms, was attacked, and died on the 15th December. "This was followed by two fresh cases on the 7th, one admitted from the off-room of the same hut as the preceding cases, and the other from a row of "married quarters on the platform immediately below it, both terminating "fatally, one on the 12th and the other on the 15th of the month. A fifth "case was admitted, on the 9th December, from an end room of another row "of married quarters below the preceding, and died on the 13th; on the following day, another case, the sixth, was admitted from the same hut as the

" first three, and on the 16th a seventh case occurred in a hut at the lower *West Indies* part of the Infantry lines, just above the Royal Artillery huts. No other *Command.* case presented itself until the 22nd and 23rd, when the eighth and ninth cases were received, both, it may be said, from the same hut as the preceding, but not until after they had vacated it and been moved into another higher up the cantonment."

The Battery of Royal Artillery was moved on the 14th November to the Camp of Isolation, "Hope Estate," halfway between Newcastle and Kingston, where one other case, not mentioned above, occurred within 56 hours of their arrival. The married people and part of the Infantry were, at the same date, accommodated with quarters higher up the hill, as a temporary measure, and on the occurrence of two cases on the 22nd and 23rd, all the occupied huts on the infected ridge were vacated, and the occupants moved into camp on "Farm Ridge" and "Albergos Knoll." The removal of the troops had the effect of putting an end to the epidemic, for no further cases occurred among them. Two more, however, were reported among some soldiers' families at Newcastle in January of the following year. The camp was broken up in February 1878, and the troops were sent to Port Royal and Up Park Camp.

*Paroxysmal Fevers* show a higher admission rate than in 1876. There was one fatal case in Honduras.

*Rheumatism* was rather more prevalent than in the preceding year.

*Syphilis* showed a rate of admissions nearly double that of 1876, the increase being due to a greater prevalence of this disease among the troops at Barbadoes.

*Phthisis and Scrofula* were more prevalent than in 1876.

LOCAL DISEASES.—*Diseases of the nervous, circulatory, digestive, and urinary systems* were less prevalent, and those of the other groups were more so than in the preceding year. Two deaths occurred from apoplexy (one in hospital at Barbadoes, the other out of hospital at Newcastle, Jamaica), one from disease of the heart at Barbadoes, one from bronchitis and one from abscess of the liver in Trinidad.

CONDITIONS.—Admissions for debility were (within a fraction) in the same proportion as in 1876.

POISONS.—There is no material difference in the rate of admissions under this head.

INJURIES were, in proportion, slightly in excess of the previous year; one fatal case occurred at Trinidad from drowning. *Self-inflicted*.—One man committed suicide by hanging himself while in confinement in the Military Prison, Barbadoes.

## II. BLACK TROOPS.

The Black Troops serving in the Command consisted of 1st West India Regiment, a wing of 2nd West India Regiment, and a detachment of the corps of Military Labourers.

The stations occupied were Barbadoes, Jamaica, Nassau, and Honduras by the 1st West India Regiment, and Demerara and Tobago by the detachment of 2nd West India Regiment.

The average annual strength of the non-commissioned officers and men (exclusive of White Staff Sergeants) was 969; the admissions into hospital were 1,041; the deaths 19; and the average number of constantly sick 51·48. The proportions given by these numbers are, for admissions, 1,074; for deaths, 19·60; and for constantly sick, 53·13 per 1,000 of the strength, respectively. Contrasted with the preceding year the admission rate is 116 per 1,000 lower, the death rate '98 higher, and that of constantly sick 2·75 lower.

West Indies  
Command.

The admissions in the different classes and orders of diseases are shown in the following Table :—

Orders.	Black Troops.	1877.				1869-76.	
		Strength, 969.		Ratio per 1,000.		Ratio per 1,000.	
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	<b>I. General Diseases.</b>						
1	Febrile Group - -	298	4	307.5	4.13	179.3	2.23
2	Constitutional Group -	198	9	204.3	9.29	245.9	8.57
	<b>II. Local Diseases.</b>						
	Diseases of the—						
1	Nervous System - -	12	—	12.4	—	19.1	1.30
2	Eye - - - -	8	—	8.3	—	18.0	—
3	Ear - - - -	1	—	1.0	—	2.8	—
4	Nose - - - -	—	—	—	—	.7	—
5	Circulatory System -	2	2	2.1	2.06	9.8	1.58
6	Absorbent „ - -	16	—	16.5	—	22.1	—
7	Ductless Glands - -	—	—	—	—	—	—
8	Respiratory System -	44	2	45.4	2.06	59.7	2.42
9	Digestive „ - -	71	1	73.3	1.03	92.0	1.49
10	Urinary „ - -	179	—	184.7	—	140.3	.93
11	Generative „ - -	23	—	23.7	—	22.5	—
12	Organs of Locomotion -	5	—	5.2	—	10.9	.37
13	Cellular Tissues - -	25	—	25.8	—	22.9	.09
14	Cutaneous System - -	80	—	82.6	—	82.9	—
	<b>III. Conditions, &amp;c.</b>						
	Debility - - - -	4	1	4.1	1.03	4.7	.09
	<b>IV. Poisons.</b>	—	—	—	—	2.9	—
	<b>V. Injuries.</b>						
1	Battle - - - -	—	—	—	—	1.2	.19
2	Accidental - - -	75	—	77.4	—	96.8	.65
4	Self-inflicted - -	—	—	—	—	.2	.29
	<b>VI. Surgical Operations.</b>	—	—	—	—	1.0	—
	No appreciable disease -	—	—	—	—	.9	.09
	<b>Total - - - -</b>	<b>1,041</b>	<b>19</b>	<b>1074.3</b>	<b>19.60</b>	<b>1036.6</b>	<b>20.29</b>
	<b>Average of 10 years, } 1867-76 - - - }</b>	—	—	1043.7	21.24	—	—

**GENERAL DISEASES.**—The rate of admissions for diseases of this class is 511.8 per 1,000 of the strength, or 22.5 less than in 1876, and that of deaths is 13.42, or .68 higher. The *febrile group* gives a higher rate of admissions by 24.2, and of deaths by 2.17 per 1,000 of strength; and the *constitutional group* lower rates of admissions and deaths by 46.7 and 1.49, respectively, than for the preceding year.

The admissions and deaths from the principal diseases of this class are shown in the following Table:— *West Indies Command.*

Black Troops.	1877.				1869-76.	
	Strength, 969.		Ratio per 1,000.		Ratio per 1,000.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
<b>General Diseases.</b>						
<i>Febrile Group—</i>						
Eruptive Fevers - - -	1	—	1·0	—	5·0	·09
Continued " - - -	79	—	81·5	—	46·4	·75
Yellow " - - -	1	—	1·0	—	·5	·09
Paroxysmal " - - -	195	4	201·2	4·13	121·2	1·21
Cholera - - -	—	—	—	—	—	—
Influenza - - -	—	—	—	—	1·2	—
Erysipelas - - -	—	—	—	—	·4	—
Other Diseases - - -	22	—	22·7	—	4·6	·09
Total of Febrile Group -	298	4	307·4	4·13	179·3	2·28
<i>Constitutional Group—</i>						
Rheumatism - - -	48	—	49·5	—	69·8	·09
Syphilis - - -	131	—	135·2	—	147·4	·19
Scrofula, Phthisis - -	16	9	16·5	9·29	26·3	8·20
Scurvy and Purpura - -	—	—	—	—	·2	—
Anæmia - - -	2	—	2·1	—	1·5	—
Other Diseases - - -	1	—	1·0	—	·7	0·9
Total of Constitutional Group	198	9	204·3	9·29	245·9	8·57

*Eruptive Fevers.*—One case of measles occurred at Honduras.

*Continued Fevers.*—The rate of admissions exceeds that of 1876 by 17·8.

*Yellow Fever.*—One case occurred in Jamaica. A sergeant of the 1st West India Regiment had been employed at Savannah-la-Mar, Westmorland, on recruiting duty, when he became ill. He recovered.

*Paroxysmal Fevers.*—The rate of admissions is less by 14·5 than that of 1876. There were three deaths from remittent fever and one from ague.

*Rheumatism.*—The rate of admissions is less by 33·8 per 1,000 men than that of the preceding year.

*Syphilis.*—The rate of admissions is less by 9·9 per 1,000 than that of the preceding year.

*Scrofula and Phthisis.*—The rates of admissions and deaths are less by 4·1 and 1·49, respectively, than in 1876. The deaths were all from phthisis, the most fertile cause of mortality among the black population in the West Indies, and a strong contrast to the mortality from the same cause among the European Troops, which for this year has been "nil."

**LOCAL DISEASES.**—The admission rates for *diseases of the eye, the ear, the nervous, circulatory, respiratory, digestive, generative, and cutaneous systems, of the organs of locomotion, and of the cellular tissue* are lower than in the preceding year, and those for *diseases of the absorbent and urinary systems* are a little higher. The deaths in this class were five in number, two from heart disease, one from pneumonia, one from empyema, and one from stricture of the intestines.

*Conditions.*—The admission rate is a fraction per 1,000 less than in 1876. One death occurred under this head in Jamaica.

**INJURIES.**—The rate of admissions is fractionally lower than last year.



*West Indies  
Command.*

*Section II.*

*On the Extent of Invaliding.*

Forty-two non-commissioned officers and men of the White Troops were invalided home, and 19 invalids from the Command were finally discharged the service during the year.

Sixteen non-commissioned officers and men of the Black Troops serving in the West Indies, and 22 in the West Africa Settlements Command, were discharged the service during the year.

The classes and orders of the diseases which necessitated the invaliding are shown in the following table:—

	White Troops.		Black Troops.
	West Indies Command.		West Indies and West Africa Settlements Commands.
Mean Strength - - -	1,133.		1,609.
Classes of Disabilities.	Invalids sent Home.	Finally Discharged.	Discharged as Invalids in the Colonies.
<b>I. General Diseases.</b>			
Rheumatism - - -	4	1	4
Syphilis - - -	5	1	1
Scrofula - - -	1	—	2
Phthisis - - -	1	1	12
Purpura - - -	1	—	—
Anæmia - - -	1	—	—
Other Diseases - - -	—	—	1
<b>II. Local Diseases.</b>			
Nervous System - - -	2	—	4
Eye - - -	—	—	2
Ear - - -	1	—	—
Circulatory System - - -	6	6	1
Respiratory " - - -	3	—	2
Digestive " - - -	7	—	2
Urinary " - - -	—	1	2
Generative " - - -	4	—	—
Organs of Locomotion - - -	1	4	1
Cellular Tissue - - -	—	—	1
Cutaneous System - - -	1	1	1
<b>III. Conditions.</b>			
Debility - - -	3	4	1
<b>IV. Injuries.</b>			
Accidents - - -	1	—	1
Total - - -	42	19	38
Ratio per 1,000 of { 1877 - - -	37·07	16·77	28·62
mean strength - { 1867-76 - - -	27·17	12·76	19·20

## Section III.

West Indies  
Command.

## Mean Daily Sick.

The average number of White Soldiers constantly in hospital was 57; of Black Soldiers the number was 51.

Compared with the preceding year this gives an increase of 12 constantly sick for the former and a decrease of 6 for the latter.

The usual information calculated from the number of constantly sick is given in the following table:—

—				White Troops.	Black Troops.
Ratio per 1,000 of the strength constantly sick	1877	-	-	50.43	53.13
	1867-76	-	-	40.98	57.81
Mean sick time to each soldier	1877	-	-	18.82	18.05
	1867-76	-	-	14.96	21.10
Average duration of each case of sickness	1877	-	-	18.41	19.39
	1867-76	-	-	16.32	18.64

## Section IV.

## On the Influence of Age on the Mortality.

The relation of mortality to age (in quinquennial periods) is shown in the following table:—

—	Under 20.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
	38	—	527	6	352	7	103	2	93	1	28	2
Ratio per 1,000 of strength - } 1877	—		11.39		19.89		19.42		10.75		71.43	

## VII.—ON THE HEALTH OF THE TROOPS SERVING IN THE WEST AFRICA SETTLEMENTS COMMAND.

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### Section I.

#### *Sickness and Mortality.*

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#### STATISTICAL REPORT.

##### 1. WHITE TROOPS.

*West Africa.* The average annual strength of the European non-commissioned officers serving in the Command was 11; the admissions into hospital among them were 24; no death occurred; two staff-sergeants were invalided. The average number of constantly sick was 57.

Most of the admissions were due to paroxysmal fevers.

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##### 2. BLACK TROOPS.

The Black Troops in the Command consisted of the head-quarters of the 1st West India Regiment from the 1st of January to the 3rd of March, and of the head-quarters of the 2nd West India Regiment from the 13th of February to the 31st of December. The stations occupied were Sierra Leone, and Cape Coast.

The average annual strength of the troops was 640 non-commissioned officers and men, amongst whom there were 1,098 admissions into hospital, and 12 deaths, and an average constantly sick of 44·38. The rates given by these numbers are, for admissions, 1715·6, for deaths, 18·75, and for constantly sick 69·34 per 1,000 of the strength respectively. The rate of admissions is 309·9, and that of deaths is 3·53 per 1,000 men higher, than in the preceding year; the constantly sick rate also is higher by 13·9 per 1,000 men. These material augmentations in the rates of sickness and its result, coincide with the arrival of a considerable body of fresh troops in the Command.

For the Sierra Leone station the admission rate is 1509, the death rate 15·18, and the constantly sick rate 69·07 per 1,000 of the mean strength. For the Cape Coast station the admission rate is 2249·1, the death rate is 27·97, and the constantly sick rate is 76·02 per 1,000 of the mean strength.

The admissions and deaths in each class, and in each order of diseases, are *West Africa*. shown in the following table :—

Orders.	Black Troops.	1877.				1869-76.	
		Mean Strength 640.		Ratio per 1,000.		Ratio per 1,000.	
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	<b>I.—General Diseases.</b>						
1	Febrile Group - -	375	1	586·0	1·56	503·9	5·61
2	Constitutional Group -	235	5	367·2	7·81	250·9	7·19
	<b>II.—Local Diseases.</b>						
	Diseases of the—						
1	Nervous System - -	9	1	14·1	1·56	15·9	2·47
2	Eye - - - -	18	—	28·1	—	20·9	—
3	Ear - - - -	10	—	15·6	—	2·9	—
4	Nose - - - -	—	—	—	—	·7	—
5	Circulatory System -	11	—	17·2	—	7·0	1·12
6	Absorbent „ - -	18	—	28·1	—	17·5	—
8	Respiratory „ - -	47	1	73·4	1·56	90·7	3·82
9	Digestive „ - -	81	3	126·6	4·69	202·6	8·31
10	Urinary „ - -	95	—	148·4	—	115·7	·90
11	Generative „ - -	11	—	17·2	—	24·7	—
12	Organs of Locomotion -	4	—	6·2	—	14·4	·45
13	Cellular Tissue - -	26	—	40·6	—	45·6	·45
14	Cutaneous System - -	72	—	112·5	—	135·9	—
	<b>III.—Conditions.</b>						
	Debility - - - -	17	1	26·6	1·56	12·1	—
	<b>IV.—Poisons</b>	—	—	—	—	1·1	—
	<b>V.—Injuries.</b>						
1	Battle - - - -	—	—	—	—	15·7	1·57
2	Accidental - - -	69	—	107·8	—	82·6	·90
3	Homicidal - - -	—	—	—	—	·2	·22
4	Self inflicted - -	—	—	—	—	·9	—
5	Judicial - - - -	—	—	—	—	·7	—
	<b>VI.—Surgical Operations.</b>	—	—	—	—	·4	—
	Not stated - - -	—	—	—	—	1·1	—
	No appreciable disease -	—	—	—	—	·4	—
		1,098	12	1715·6	18·74	1564·5	33·01
Average of 10 years 1867-76 - - -				1491·7	34·41		

*General Diseases.*—The rate of admissions for this class of diseases is 225·6 per 1,000 men in excess of the rate in 1876; for the febrile group of the class the rate is higher by 157·4 per 1,000 men; for the constitutional group it is higher by 68·2 per 1,000. The rate of mortality for the whole class, and for each of its groups, is not materially different in the two years.

West Africa.

The admissions and deaths from the principal diseases in this class are shown in the following table:—

Black Troops.			Ratio per 1,000 of Strength 1877.		Ratio per 1,000 of Mean Strength 1875-76.	
General Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
<i>Febrile Group.</i>						
Eruptive Fevers -	—	—	—	—	3·6	—
Continued " -	1	—	1·6	—	8·8	—
Paroxysmal Fevers -	372	1	581·3	1·56	560·3	2·81
Influenza -	2	—	3·1	—	—	—
Other Diseases -	—	—	—	—	10·0	—
Total of Febrile Group -	375	1	586·0	1·56	582·7	2·81
<i>Constitutional Group.</i>						
Rheumatism -	68	—	106·3	—	101·8	—
Syphilis -	145	—	226·5	—	120·2	—
Scrofula, Phthisis, &c. -	18	5	28·1	7·81	20·5	6·01
Anæmia -	1	—	1·6	—	3·2	—
Other Diseases -	3	—	4·7	—	3·2	·40
Total of Constitutional Group -	235	5	367·2	7·81	248·9	6·41

*Paroxysmal Fevers.*—The rate of admissions is 200·3 per 1,000 men higher than in the preceding year. There is no considerable difference in the rate of prevalence of fevers of this nature in the two divisions of the Command; the death from remittent fever occurred at Cape Coast.

*Rheumatism.*—The rate of prevalence of this disease is 43·4 per 1,000 men higher than in 1876.

*Syphilis.*—The rate of prevalence is 22·7 per 1,000 men higher than in the preceding year.

*Scrofula, Phthisis, &c.*—The rate of prevalence is 5·2 per 1,000 men higher than in 1876, the rate of mortality from diseases in the order is fractionally higher.

*Other Diseases.*—One of the admissions was for cancer, two were for general dropsy.

*Local Diseases.—Diseases of the Nervous System.* The rate of admissions is 4·6 per 1,000 men in excess of the rate of 1876; the death in this order was attributed to sunstroke. Compared with the preceding year, the rate of admission is higher for diseases of the eye, of the ear, of the circulatory and of the respiratory systems, and for diseases of the cellular tissue, but is lower for diseases of the absorbent, digestive, urinary, generative, and cutaneous systems; in the last named there were six admissions for guinea worm: of the deaths in diseases of the digestive system two were due to hepatitis, and one to dysentery.

*Debility.*—The rate of admissions exceeds that of 1876 by 20·9 per 1,000 men; a death (at Sierra Leone) is recorded under this condition.

*Injuries.—Accidental.*—The rate of admissions exceeds that of the preceding year by 39·1 per 1,000 men.

#### Officers.

In an average annual strength of 37 officers, there were 71 attacks of illness, and one death, being in the proportions of 1919 and of 27·03 per 1,000 of

the strength respectively; most of the admissions were due to fevers or to their consequences. Seven officers (being nearly one-fifth of the whole number) were invalided to England, three on account of remittent fever, and four on account of debility. *West Africa.*

*Women.*

In an average annual strength of 61 women (of West Indian or of African origin), the wives of non-commissioned officers and men, there were 143 attacks of illness, being in the rate of 2344·2 per 1,000 of the strength; most of the illnesses were from paroxysmal fevers.

*Children.*

In an average annual strength of 56 children of non-commissioned officers and men, there were 84 attacks of illness (being in the rate of 1500 per 1,000 of the strength), and six deaths (being in the rate of 107·14 per 1,000); 52 of the illnesses were from paroxysmal fevers, and 12 were from dysentery, or from diarrhoea. The deaths were due to remittent fever (2), meningitis (1), diarrhoea (3).

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# VIII.—ON THE HEALTH OF THE TROOPS SERVING AT THE CAPE OF GOOD HOPE AND AT ST. HELENA.

## Section I.

### Sickness and Mortality.

#### STATISTICAL REPORT.

#### *Cape of Good Hope and St. Helena.*

The average annual strength of the non-commissioned officers and men was 3,738, of whom 225 were stationed in St. Helena. The admissions into hospital (in both portions of the Command) were 3,116; the deaths were 32 (inclusive of those of 3 invalids who died at Netley or on their voyage home); the average number constantly sick was 175. The proportions given by these numbers are—for admissions, 833·6; for deaths, 8·56; and for constantly sick, 46·82 per 1,000 of the strength respectively. The admission rate is 68·7, that for the deaths ·89, and that for the constantly sick 6·66 higher than in 1876.

The troops stationed in the St. Helena portion of the Command consisted of a detachment of Royal Artillery, 7th Company, Royal Engineers, H Company, 1st Battalion, 24th Regiment, which was relieved by C Company, 88th, on 15th July, garrison staff, and detachments of departmental corps.

The average annual strength was 225, the admission rate 72·9 per 1,000 of the strength, and that of the deaths 8·89.

The corps of which the force (in the Cape of Good Hope portion of the Command only) consisted, and certain of the most important of their health statistics, are shown separately in this Table, which is taken from the Report of the Principal Medical Officer:—

Corps.	Years of Service in the Command.	Average Annual Strength.	Admitted into Hospital.	Died.	Invalided.	Ratio per 1,000 of Strength.			Stations.
						Admitted.	Died.	Invalided.	
Royal Artillery -	1	139·2	150	3	6	1,079·1	21·5	43·1	Cape Town, King William's Town, Natal, and Field.
Royal Engineers -	1	65·7	40	—	—	615·3	—	—	Ditto ditto.
2nd Batt., 3rd Buffs	1½	456·5	425	3	12	932·0	6·5	26·3	Natal.
1st Batt., 13th Light Infantry.	2	791·1	557	5	21	701·5	6·2	26·4	Ditto.
1st Batt., 24th Regiment.	2	744·0	673	2	16	904·5	2·6	21·5	Cape Town, King William's Town, Natal, and Field.
32nd Regiment -	3	312·2	184	2	3	589·9	6·4	9·6	King William's Town.
80th Regiment -	1½	614·6	502	7	5	817·5	11·2	8·1	Natal.
88th Regiment -	1½	303·9	399	5	2	1,312·5	16·4	6·6	Cape Town, King William's Town, and Field.
Staff and Departmental corps.	—	52·6	22	—	—	423·0	—	—	Throughout the Command.
75th Regiment -	—	—	—	—	1*	—	—	—	—

\* A deserter rejoined.

The admissions and deaths, in the various classes and orders of diseases, are shown in the following Table:—

*Cape of Good Hope and St. Helena.*

Orders.	Diseases.	1877.						1869-76.	
		Mean Strength, 3,738.						Annual Ratio per 1,000 of the Strength.	
		Admitted.	Deaths.			Ratio per 1,000.			
			In the Command.	Of Invalids.	Total.	Admitted.	Died.		
Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.		
I. General Diseases.									
1	Febrile Group -	302	5	—	5	80·8	1·34	97·1	·71
2	Constitutional „ -	657	2	2	4	175·8	1·07	182·5	2·07
II. Local Diseases.									
Diseases of the—									
1	Nervous System -	36	2	—	2	9·6	·53	12·2	1·19
2	Eye - - -	135	—	—	—	36·1	—	40·2	—
3	Ear - - -	25	—	—	—	6·7	—	4·8	—
4	Nose - - -	—	—	—	—	—	—	·4	—
5	Circulatory System -	61	2	—	2	16·3	·53	13·0	1·63
6	Absorbent „ -	82	—	—	—	21·9	—	17·5	—
8	Respiratory „ -	107	4	1	5	28·6	1·34	32·8	·84
9	Digestive „ -	435	5	—	5	116·4	1·34	141·0	1·63
10	Urinary „ -	237	—	—	—	63·4	—	148·9	·09
11	Generative „ -	32	—	—	—	8·6	—	13·0	—
12	Organs of Locomotion	14	—	—	—	3·7	—	5·1	·13
13	Cellular Tissue -	100	—	—	—	26·8	—	24·4	—
14	Cutaneous System -	328	—	—	—	87·7	—	82·1	—
III. Conditions, &c.									
	Debility - -	43	—	—	—	11·5	—	7·7	·13
IV. Poisons.									
		29	1	—	1	7·8	·27	7·0	·39
V. Injuries.									
1	Battle - - -	3	1	—	1	·8	·27	—	—
2	Accidental - -	489	7	—	7	130·8	1·87	130·0	1·15
3	Homicidal - -	—	—	—	—	—	—	} ·2	{ ·04 ·26
4	Self-inflicted -	—	—	—	—	—	—		
VI. Surgical Operations.									
	No appreciable disease.	1	—	—	—	·3	—	1·0	—
	Total -	3,116	29	3	32	833·6	8·56	961·4	10·26
	Average of 10 years, 1867-76.	—	—	—	—	1,011·5	10·51	—	—

**GENERAL DISEASES.**—The rate of admissions is 41·2, and that of the deaths ·95 higher than in 1876. The increase occurs in both the *febrile* and *constitutional* groups.



*Cape of Good Hope and St. Helena.*

The admissions and deaths from the principal diseases in this class are shown in the following Table:—

General Diseases.	1877.						1869-76.	
	Mean Strength, 3,738.						Annual Ratio per 1,000 of the Strength.	
	Admitted.	Deaths.			Ratio per 1,000.			
		In the Command.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
<i>Febrile—</i>								
Eruptive Fevers - -	13	—	—	—	3·5	—	1·3	—
Continued " - -	195	4	—	4	52·2	1·07	42·8	·36
Paroxysmal " - -	62	—	—	—	16·6	—	28·2	·26
Cholera - -	—	—	—	—	—	—	·1	—
Influenza - -	20	—	—	—	5·3	—	20·4	—
Erysipelas - -	12	1	—	1	3·2	·27	3·3	·09
Other Diseases - -	—	—	—	—	—	—	1·0	—
Total of Febrile Group	302	5	—	5	80·8	1·34	97·1	·71
<i>Constitutional—</i>								
Rheumatism - -	188	—	—	—	50·3	—	42·5	·04
Syphilis - -	446	—	—	—	119·3	—	129·7	·18
Scrofula, Phthisis, &c. - -	18	2	2	4	4·8	1·07	8·2	1·85
Scurvy and Purpura - -	—	—	—	—	—	—	·1	—
Anæmia - -	4	—	—	—	1·1	—	1·1	—
Other Diseases - -	1	—	—	—	·3	—	·9	—
Total of Constitutional Group	657	2	2	4	175·8	1·07	182·5	2·07

*Eruptive Fevers.*—The admission rate is 3·1 per 1,000 of the strength higher than in 1876. There were 13 admissions; of which 3 were for scarlatina and 10 for measles; all occurred at the Cape.

*Continued Fevers.*—The admission rate was 1·1 per 1,000 of the strength higher than in the preceding year, and there was an increase of ·70 in the mortality rate. The deaths, 4 in number, were all from *enteric fever*, 3 occurred in the expeditionary force at Pretoria, and 1 at East London. Of the admissions, 18 (all at the Cape, where last year there were only 3) were due to *enteric fever*. Of these 15 occurred in the force which left Newcastle April 17th, and arrived at Pretoria May 4th, during which month 9 cases came into hospital, 3 more were admitted in June and 3 in August. The remaining admissions, 3 in number, occurred 1 at East London in June, 1 at Newcastle in October, and 1 at Simons Town in November.

*Paroxysmal Fevers* were more prevalent than during last year, the admission rate shows an increase of 1·7 per 1,000 of the strength.

*Erysipelas.*—The admission rate though higher than in 1876 was not above the average. One death occurred at Natal.

*Rheumatism.*—The admission rate is higher by 1·7 per 1,000 of the strength than in the preceding year.

*Syphilis.*—At St. Helena there were 14 admissions, of which 7 were for primary and 7 for secondary syphilis. The Principal Medical Officer reports that the disease at the Cape "has increased to the extent of 34·3 per 1,000 over the rates of 1876, but is 12·3 lower than the average of the six preceding years. This large increase is due to the 1st Battalion, 24th Regiment, in which the disease has been very prevalent, especially when at Cape Town."

*Scrofula and Phthisis.*—The admission rate is fractionally lower and the death rate '34 higher than last year. Of the 4 deaths, 2 occurred at the Cape and 2 at Netley, the latter being invalids from the Cape. *Cape of Good Hope and St. Helena.*

**LOCAL DISEASES.**—*Diseases of the Nervous System* were more prevalent. Two cases proved fatal, one from *heat apoplexy* at East London, and one from *meningitis* at Newcastle.

*Diseases of the Eye*—The admission rate is lower by a fraction than in 1876. At the Cape there were altogether 129 cases, of these 118 were admitted for *conjunctivitis*, 51 at Pretoria and 31 at Pietermaritzburg. At the former station the Medical Officer in Charge can assign no cause as "there is very little sun-glare, and very little fine sand or dust in the atmosphere." At the latter the Principal Medical Officer writes, "there are frequent hot winds with dust, but the disease can scarcely be attributed to them, for in Cape Town where the S.E. wind blows for days together, raising clouds of dust, fine sand, and even gravel, the disease does not prevail, and only 7 cases were treated in the hospital during the year. *Conjunctivitis* is very prevalent amongst the civil population, especially children, during the autumnal months at King William's Town, Pietermaritzburg, and Pretoria."

*Diseases of the Circulatory System* were more prevalent, but less fatal, than in the previous year. The deaths were both from aneurism of the aorta.

*Diseases of the Respiratory System* show a lower rate of admission by 1·7 and a higher rate of mortality by '25 per 1,000 of the strength. Four deaths occurred at the Cape from pneumonia, and a man invalided for this disease died on the voyage home.

*Diseases of the Digestive System.*—These diseases were much more prevalent than in 1876; the admission rate is 17·5 per 1,000 higher, and that for the deaths is fractionally lower. Tonsillitis, dysentery, and diarrhoea were the principal causes of the increase in the admission rate. To dysentery 3 deaths were due, to diarrhoea 1, and to hepatic abscess, 1.

*Diseases of the Urinary System* were less prevalent, and at the Cape the Principal Medical Officer reports a decrease of 19 per 1,000 in the admissions for gonorrhoea.

*Diseases of the Cutaneous System.*—To ulcers and boils, the increased rate of admissions for these affections is chiefly due.

**POISONS.**—There is a large increase in the rate of admissions. The death occurred in a young soldier who drank, for a bet, a pint of Cape spirit, which in a short time produced insensibility and death.

**INJURIES.**—*Battle.*—There were 3 admissions for gunshot wounds occurring, on 30th December, in an action against the Gaika Kafirs at Draibosch. One, a gunshot wound of the abdomen with protrusion of the intestines, proved fatal on the following day; the second was a lacerated gunshot wound of the wrist; and the third a gunshot wound of the back.

*Accidents.*—There were 6 fatal accidents at the Cape, and 1 at St. Helena. At the former station 2 men were asphyxiated while drunk, 1 from plugging of the air passages, in the second case the cause of death is not mentioned; 2 men were drowned while bathing; 1 man was killed by a fall from a horse; and 1 was crushed by several tons of earth falling on him while working on the railway. At the latter station a soldier, while assisting to fire a Royal Salute on the Queen's birthday, was blown over the rocks at Ladder Hill Fort, and killed.

#### Officers.

The average annual strength of the officers serving in the Command was 155, amongst whom there were 82 attacks of illness and 5 deaths; 8 were invalided to England, being in the annual rates of 529·, of 32·26, and 51·61 per 1,000 of the strength respectively. The causes of death were, 1 erysipelas, 1 softening of the brain, 1 paralysis, 1 calculus of kidney, 1 injury to spinal cord.

#### Women.

The annual average strength of the wives of the non-commissioned officers and men was 262, amongst whom 100 cases of illness occurred, being in the ratio of 381·6 per 1,000. There was no death.

*Children.*

*Cape of Good  
Hope and  
St. Helena.*

In a strength of 557 children of non-commissioned officers and men there were 366 attacks of illness and 17 deaths, being in the proportions of 657, and of 30.52 per 1,000 of the strength respectively. The deaths were due to, ague 1, scrofula 3, phthisis 1, convulsions 3, valve disease of heart 1, bronchitis 4, croup 1, diarrhoea 1, and debility 2.

*Section II.**On the Extent of Invaliding.*

Sixty-nine invalids were sent home from the Command (66 from the Cape and 3 from St. Helena) and 45 were finally discharged the service during the year, being in the rates of 18.46 and of 12.04 per 1,000 of the strength respectively.

The classes and orders of the diseases which caused the invaliding of the year are shown in the following Table :—

Disabilities.	Invalids sent to England from the Cape of Good Hope Command.	Invalids finally discharged the Service.
<b>I. General Diseases.</b>		
Febrile Group - - - -	1	—
Constitutional Group - - - -	25	14
<b>II. Local Diseases.</b>		
Diseases of the—		
Nervous System - - - -	11	2
Eye - - - -	7	3
Ear - - - -	3	1
Circulatory System - - - -	10	10
Respiratory " - - - -	1	—
Digestive " - - - -	1	1
Organs of Locomotion - - - -	1	3
Cellular Tissue - - - -	1	1
<b>IV. Conditions.</b>		
General Debility - - - -	3	4
<b>V. Injuries.</b>		
Accidental - - - -	5	6
Total - - - -	69	45
Ratio per 1,000 of Mean { 1877 -	18.46	12.04
Strength - - - { 1867-76 -	24.66	17.68

Compared with the invaliding for 1876, higher rates are observed, both of men sent home and finally discharged the service, by 8.24 and 2.91 per 1,000 of the strength respectively.

*Section III.**Mean Daily Sick.**Cape of Good  
Hope and  
St. Helena.*

The average number of constantly sick was 175, being in the rate of 46·82 per 1,000 of the strength.

The usual information calculated from this number is given in the following Table:—

	1877.	1867-76.
Ratio per 1,000 constantly Sick - -	46·82	48·49
Average Sick time to each Soldier - -	days. 17·09	days. 17·70
Average duration of each case of Sickness -	20·50	17·49

*Section IV.**Influence of Age on the Mortality.*

As no information was received from some of the Stations at the Cape, the usual table cannot be furnished for this year.

# IX.—ON THE HEALTH OF THE TROOPS SERVING IN THE ISLAND OF MAURITIUS.

## SECTION I.

### *Sickness and Mortality.*

#### STATISTICAL REPORT.

#### *Mauritius.*

In an annual average strength of 429 non-commissioned officers and men, there were 998 admissions into hospital, and 10 deaths, being in the rates of 2326·3, and of 23·31 per 1,000 of the strength respectively. The average number of constantly sick was 30·08, being in the rate of 70·12 per 1,000 of the strength. The admission rate is 707·9, the death rate is 16·50, and the constantly sick rate is 32·35 per 1,000 men higher, than the corresponding rate of the preceding year.

The composition of the force, and some of the health statistics of each arm, are shown in the following Table:—

Corps.	Average Annual Strength.	Admitted into Hospital.	Died.	Invalided.	Ratio per 1,000 of the Strength.		
					Admitted.	Died.	Invalided.
10th Battery, 7th Brigade, Royal Artillery - - -	93	278	3	—	2989·2	32·26	—
2nd Battalion, 3rd Foot - -	321	708	7	12	2205·6	21·81	37·38
Departmental Corps, &c. - -	15	12	—	—	800·0	—	—

The admissions and deaths in the various classes and orders of diseases are *Mauritius*, shown in the following Table:—

Order.	Diseases.	1877.						1869-76.	
		Mean Strength, 429.						Ratio per 1,000.	
		Admitted.	Died.			Ratio per 1,000.			
			At Mauritius.	Invalids.	Total.				
		Admitted.				Admitted.	Died.	Admitted.	Died.
I.—General Diseases.									
1	Febrile Group -	519	2	—	2	1209·8	4·66	770·2	2·81
2	Constitutional Group -	69	1	—	1	160·9	2·33	106·8	2·56
II.—Local Diseases.									
Diseases of the—									
1	Nervous System -	11	—	—	—	25·6	—	11·0	1·02
2	Eye -	4	—	—	—	9·3	—	13·6	—
3	Ear -	9	—	—	—	21·0	—	8·0	—
4	Nose -	—	—	—	—	—	—	—	—
5	Circulatory System	8	—	—	—	18·6	—	12·8	1·79
6	Absorbent "	26	—	—	—	60·6	—	13·8	—
7	Ductless Glands	—	—	—	—	—	—	·1	—
8	Respiratory System	40	—	—	—	93·3	—	38·6	·77
9	Digestive "	89	3	—	3	207·6	6·99	201·4	3·83
10	Urinary "	62	—	—	—	144·6	—	54·0	—
11	Generative "	11	—	—	—	25·6	—	11·0	—
12	Organs of Locomotion	6	—	—	—	14·0	—	5·4	—
13	Cellular Tissue -	37	—	—	—	86·3	—	25·3	—
14	Cutaneous System	32	—	—	—	74·6	—	65·0	—
III.—Conditions, &c.									
	Debility -	4	—	—	—	9·3	—	7·2	—
IV.—Poisons.									
		1	—	—	—	2·0	—	22·0	1·02
V.—Injuries.									
2	Accidental -	70	4	—	4	163·2	9·33	109·2	·51
4	Self-inflicted -	—	—	—	—	—	—	—	·26
VI.—Surgical Operations.									
		—	—	—	—	—	—	·8	—
Total -									
		998	10	—	10	2326·3	23·31	1475·7	14·57
Average of 10 years, } 1867-76 - }									
		—	—	—	—	1799·7	22·38	—	—

**GENERAL DISEASES.**—Compared with the preceding year there is an increase of 579·8 per 1,000 men in the rate of admissions; of this, 523·4 per 1,000 is in the *febrile group*, and 56·4 in the *constitutional*. The rate of mortality is higher by 4·72 per 1,000 men, of which 2·39 is in the *febrile*, and 2·33 in the *constitutional group*.

*Mauritius.*

The admissions and deaths from the principal diseases in this class are shown in the following Table :—

General Diseases.	Strength, 429.		Annual Ratio per 1,000 of the Strength.			
	Admitted.	Died.	1877.		1869-76.	
			Admitted.	Died.	Admitted.	Died.
<i>Febrile Group—</i>						
Eruptive Fevers	—	—	—	—	·8	—
Continued „	—	—	—	—	64·0	—
Paroxysmal „	505	2	1177·2	4·66	689·3	2·55
Influenza	14	—	32·6	—	14·6	—
Erysipelas	—	—	—	—	1·0	—
Other Diseases	—	—	—	—	·5	·26
Total	519	2	1209·8	4·66	770·2	2·81
<i>Constitutional Group—</i>						
Rheumatism	17	—	39·6	—	35·5	—
Syphilis	42	—	98·0	—	50·7	—
Scrofula, Phthisis, &c.	3	1	7·0	2·33	8·4	2·30
Scurvy and Purpura	—	—	—	—	·3	—
Anæmia	7	—	16·3	—	11·5	—
Other Diseases	—	—	—	—	·5	·26
Total	69	1	160·9	2·33	106·9	2·56

*Continued Fevers.*—No admission for a fever of this kind took place in the year.

*Paroxysmal Fevers.*—The rate of admissions exceeds that of the preceding year by 618·1 per 1,000 men, being more than twice as high; of the admissions, 500 were for *ague*, and 5 for *remittent fever*; the deaths were due to the last-named disease. The Principal Medical Officer states, that paroxysmal fevers prevailed most in the second quarter of the year; beginning with 7 admissions in January, in April the number was 95, in May it fell to 78. It is also remarked that a similar increase of prevalence took place amongst the civil population, and with it a corresponding increase of mortality.

*Rheumatism.*—There is a higher rate of admissions for this disease than in the preceding year, a result that is probably consequent on the greater prevalence of fevers.

*Syphilis.*—The rate of admissions is higher by 34·4 per 1,000 men than that of the preceding year, an increase of one-third.

**LOCAL DISEASES.**—*Diseases of the Nervous System.*—Of the 11 admissions in this order, 9 were due to epilepsy, this number being furnished by 4 men.

*Diseases of the Eye.*—The rate of admissions is 22·5 per 1,000 men lower than in the preceding year.

*Respiratory System.*—The rate of admissions is 9·2 per 1,000 men higher than in the preceding year; excepting 5, all were for bronchitis.

*Diseases of the Digestive System.*—The rate of admissions is 28·8 per 1,000 men lower than that for the preceding year, but the rate of deaths is 4·72 per 1,000 men higher. The deaths were due to hepatitis (1), cirrhosis (1), rupture of the spleen (1).

*Diseases of the Urinary System.*—The rate of admissions is 81 per 1,000 men higher than in the preceding year, a result due to the greatly increased prevalence of gonorrhœa.

**INJURIES.**—*Accidental.*—The rate of admissions is 4 per 1,000 men higher than in the preceding year; the four deaths were from drowning.

*Officers.**Mauritius.*

In an average annual strength of 12 officers, there were four attacks of illness. One officer was invalided to England (for ague).

*Women.*

In an average annual strength of 50 women, the wives of non-commissioned officers and men, there were 18 attacks of illness and 2 deaths (in the Command); the rate of sickness is therefore 360·0, and that of deaths is 40·00 per 1,000 of the strength. The deaths were due to ague (1), to hepatitis (1).

*Children.*

In an average annual strength of 91 children of non-commissioned officers and men, 13 attacks of illness only are returned. There were seven deaths (in the Command), being in the rate of 76·92 per 1,000 of the strength. The deaths were due to anæmia (2), convulsions (3), bronchitis (1), thrush (1).

*Section II.**On the Extent of Invaliding.*

Twelve invalids were sent home from the Command, and three were finally discharged the service during the year.

The classes and orders of the diseases, which necessitated the invaliding of men, are shown in the following Table :—

Class.	Order.	Diseases.	Invalids sent Home.	Invalids discharged the Service.
I.	2	Phthisis - - - -	1	1
II.	1	Epilepsy - - - -	1	—
	5	Valve Disease of Heart - - - -	1	—
	„	Varicose Veins - - - -	1	—
	6	Inflammation of Glands - - - -	1	—
	8	Asthma - - - -	1	—
	9	Hernia - - - -	1	—
	„	Hepatitis - - - -	1	1
	10	Stricture of Urethra - - - -	1	—
	14	Ulcer - - - -	—	1
III.	—	Debility - - - -	1	—
V.	2	Wounds - - - -	2	—
		Total - - - -	12	3
		Ratio per 1,000 of the { 1877 -	27·97	6·99
		strength - { 1867-76 -	45·52	18·18

Compared with the preceding year there is an increase of 7·52 per 1,000 men in the rate of primary invaliding, whilst in the rate of final invaliding there is a decrease of 11·19 per 1,000.



*Mauritius.**Section III.**Mean Daily Sick.*

The average number of men constantly sick was 30·08.

The usual information calculated from the number of constantly sick is given in the following Table :—

—		1877.	1867-76.
Ratio per 1,000 of strength of constantly sick	- -	70·12	59·01
Mean sick time to each soldier	- - -	Days. 25·60	Days. 21·54
Average duration of each case of sickness	- - -	11·00	11·97

The rate of constantly sick is 32·35 per 1,000 men higher than that for the preceding year; the mean sick time to each soldier is 11·81 days longer; the average duration of each case of sickness is 2·48 days longer.

*Section IV.**On the Influence of Age on the Mortality.*

The death rates of the non-commissioned officers and men at the several ages arranged in quinquennial periods, are shown in the following Table :—

—		Under 20 Years.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.	
		Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
—		42	—	215	5	100	4	24	1	41	—	13	—
Rate per 1,000 of the mean strength	1877 -	—		23·26		40·00		41·67		—		—	
	10 years	9·12		14·23		17·61		21·77		25·95		28·81	

# X.—ON THE HEALTH OF THE TROOPS SERVING IN THE ISLAND OF CEYLON.

## Section I.

### *Sickness and Mortality.*

#### STATISTICAL REPORT.

THE average annual strength of the non-commissioned officers and men *Ceylon*. (White Troops) in the Command was 1,077; the admissions into hospital were 1,055; the deaths, including those of two invalids at home, were 19; the average number of constantly sick was 55·23; the admission rate is therefore 979·6, the death rate is 17·64, and the constantly sick rate is 51·28 per 1,000 of the strength, respectively. The rate of admissions is 240·8 per 1,000 men higher, than in the preceding year; the death rate is 10·21 per 1,000 higher, and the constantly sick rate is ·18 per 1,000 higher.

The corps stationed in the Command and certain of the more important of their health statistics are shown in the following Table :—

Corps.	Completed Years of Service in the Command.	Average Annual Strength.	Admitted into Hospital.	Died.	Invalided.	Average Number of Constantly Sick.	Ratio per 1,000 of the Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations.
							Admitted.	Died.	Invalided.	Constantly Sick.			
*Royal Artillery, 5th, 12th, and 18th Batteries, 7th Brigade.	—	237	220	4	—	12·27	928·3	16·88	—	51·77	Days 18·89	Days 20·36	Colombo, Galle, and Trincomalee.
57th Foot	8	821	832	15	16	42·86	1013·4	18·27	19·49	52·20	19·05	18·80	Colombo, Kandy, and Galle.
Departmental Corps, &c.	—	19	3	—	—	·10	—	—	—	—	—	—	—

\* Arrived in the Command in the beginning of the year.

Ceylon.

The admissions and deaths in the various orders of diseases are shown in the following Table:—

Orders.	White Troops.	Strength, 1,077.				Annual Ratio per 1,000.			
	Diseases.	Admitted.	Died at Ceylon.	Invalids.	Total.	1877.		1869-76.	
						Admitted.	Died.	Admitted.	Died.
	I.—General Diseases.								
1	Febrile Group -	144	9	—	9	133·8	8·35	144·8	2·16
2	Constitutional Group -	115	2	—	2	106·8	1·86	105·0	2·29
	II.—Local Diseases.								
	Diseases of the—								
1	Nervous System -	14	—	—	—	13·0	—	11·3	1·27
2	Eye -	31	—	—	—	28·8	—	35·9	—
3	Ear -	8	—	—	—	7·4	—	10·0	—
4	Nose -	—	—	—	—	—	—	·1	—
5	Circulatory System -	12	—	—	—	11·1	—	16·4	1·65
6	Absorbent -	59	—	—	—	54·8	—	33·3	—
8	Respiratory System -	30	1	—	1	27·9	·93	31·0	·38
9	Digestive -	240	4	2	6	222·8	5·57	250·0	5·72
10	Urinary -	90	—	—	—	83·6	—	79·1	·38
11	Generative -	37	—	—	—	34·3	—	25·2	—
12	Organs of Locomotion -	6	—	—	—	5·6	—	4·7	—
13	Cellular Tissue -	20	—	—	—	18·6	—	25·9	—
14	Cutaneous System -	114	—	—	—	105·8	—	99·4	·13
	III.—Conditions, &c.								
	Debility -	15	—	—	—	13·9	—	13·6	—
	IV.—Poisons.	9	—	—	—	8·4	—	15·1	·38
	V.—Injuries.								
2	Accidental -	111	1	—	1	103·0	·93	115·3	1·14
4	Self-inflicted -	—	—	—	—	—	—	·1	·26
	VI.—Surgical Operations.	—	—	—	—	—	—	·1	—
	No appreciable Disease	—	—	—	—	—	—	1·5	—
	Total -	1,055	17	2	19	979·6	17·64	1017·8	15·76
	Average of 10 years, } 1867-76 - }	—	—	—	1033·4	16·14	—	—	—

**General Diseases.**—The rate of admissions in this class exceeds that of the preceding year by 85·4 per 1,000 men; for the *febrile group* the increase is 37·1, for the *constitutional* 48·3 per 1,000 men. The rate of mortality for the whole class is higher by 8·35 per 1,000 men, of which 7·42 per 1,000 is that given by the *febrile*, and ·93 per 1,000 that by the *constitutional* group.

The admissions and deaths from the principal diseases in this class are *Ceylon*, shown in the following Table:—

Diseases.	1877.				1869-76.	
	Mean Strength, 1,077.				Annual Ratio per 1,000 of the Strength.	
	Admitted.	Died.	Ratio per 1,000.		Admitted.	Died.
			Admitted.	Died.		
<i>Febrile—</i>						
Eruptive Fevers - -	—	—	—	—	.4	—
Continued „ - -	115	6	106.8	5.57	62.1	.88
Paroxysmal Fevers - -	19	1	17.7	.93	75.2	1.02
Cholera - -	2	2	1.9	1.86	.4	.13
Influenza - -	5	—	4.6	—	4.9	—
Erysipelas - -	3	—	2.8	—	1.8	—
Other Diseases - -	—	—	—	—	.5	.13
Total of Febrile Group	144	9	133.8	8.36	144.8	2.16
<i>Constitutional.</i>						
Rheumatism - -	40	—	37.1	—	21.7	—
Syphilis - -	61	—	56.7	—	64.8	.13
Scrofula, Phthisis, &c. - -	14	2	13.0	1.86	9.7	1.90
Scurvy and Purpura - -	—	—	—	—	.7	—
Anæmia - -	—	—	—	—	6.7	—
Other Diseases - -	—	—	—	—	1.4	.26
Total of Constitutional Group	115	2	106.8	1.86	105.0	2.29

*Continued Fevers.*—The rate of prevalence of fevers of this kind is 18.5 per 1,000 men higher, than in the preceding year; the rate of mortality is 4.64 per 1,000 higher. *Enteric Fever.*—Of the seven admissions for this form of fever, one occurred at Colombo, and six at Galle; six of the attacks were fatal; the high rate of mortality to cases treated (857.14 per 1,000) raises the presumption that the worst cases only of those occurring were returned under this head. The medical officer states that enteric fever is of common occurrence amongst the native population of Colombo.

*Simple Continued Fever*, caused 72 admissions, all except 10 of which were at Colombo.

*Febricula*, caused 36 admissions. In the report of the medical officer at Galle, it is stated that cases of febricula were received in larger numbers from the locality which furnished the cases of enteric fever, than from any other.

*Paroxysmal Fevers.*—The rate of admissions is 11.2 per 1,000 men (nearly threefold) higher than in the preceding year.

*Cholera.*—The two attacks returned under this head (both of which were fatal) occurred in young men who had just arrived in the country, an illustration of the well known fact that new comers are especially liable to suffer when this disease is present. Although cholera was epidemic in several parts of the island, the troops did not suffer from it except in the instances mentioned.

*Rheumatism.*—The rate of admissions exceeds that of 1876 by 31.5 per 1,000 men, a sevenfold increase; no explanation of this excess is given in any of the reports received.

*Syphilis.*—The rate of admissions is 11.2 per 1,000 men higher than in the preceding year.

*Scrofula, Phthisis, &c.*—The rate of admissions is 5.6 per 1,000 men higher than in the preceding year.

*Ceylon.*

**LOCAL DISEASES.**—*Diseases of the Nervous System.*—The rate of admissions exceeds that of 1876 by 2·8 per 1,000 men; the illnesses in this group were of a less severe nature in the present year; death did not follow on attack in any instance. The disproportionate number of admissions for mental diseases, noticed in the preceding year, is also a feature in the present one.

*Diseases of the Eye.*—The rate of admissions is lower by 25·1 per 1,000 men, being less than half the rate of the preceding year; this is due to the fact that conjunctivitis was not epidemic in 1877.

*Diseases of the Circulatory System.*—The rate of admissions is 6·6, a third lower, than in the preceding year; most of the admissions were for palpitation.

*Diseases of the Respiratory System.*—The rate of admissions exceeds that of the preceding year by 15·8 per 1,000 men; the death in this order was from pneumonia.

*Diseases of the Digestive System.*—The rate of admissions is 76·9 per 1,000 men higher, than in the preceding year; the rate of deaths is 3·71 per 1,000 higher. The deaths were due to dysentery (2), hepatitis (3), cirrhosis (1).

*Diseases of the Urinary System.*—The rate of admissions is 22·3 per 1,000 men higher than in 1876; excepting 11 all were for gonorrhœa.

**CONDITIONS, &c.**—*Debility.*—The rate of admissions is 8·4 per 1,000 men lower than in the preceding year.

**POISONS.**—The rate of admissions is exactly the same as in the preceding year; the whole were for delirium tremens.

**INJURIES.**—*Accidental.*—The rate of admissions is 16·6 per 1,000 men higher than in 1876; the death was due to fracture of the skull.

*Officers.*

In an average annual strength of 43 officers there were 19 attacks of illness and 1 death; 6 officers were invalided to England during the year. The admission rate is 442, the death rate is 23·26, and the invaliding rate is 139·54 per 1,000 of the mean strength. The death was due to asthma. The cause of invaliding was phthisis in one instance, asthma in one, gout in one, hepatitis in two, and debility in one.

*Women.*

In an average annual strength of 71 women, the wives of non-commissioned officers and men, there were 17 attacks of illness, and (in Ceylon) 1 death, which was due to dysentery.

*Children.*

In an annual average strength of 142 children of non-commissioned officers and men, there were 31 attacks of illness and (in Ceylon) 12 deaths; the latter are in the rate of 84·51 per 1,000 of the strength. Death was due to diarrhœa in 5 instances, to convulsions in 4, to debility in 2, and to hæmorrhage in 1.

**NATIVE TROOPS.**

The Native Troops consisted of a company of Gun Lascars distributed between the stations of Colombo, Trincomalee, and Galle. The average annual strength was 86, the admissions into hospital were 22, being in the rate of 255·8 per 1,000 men. No death occurred. No men were invalided. The average number of constantly sick was 26, being in the rate of 3·02 per 1,000 of the strength.

**Section II.***On the Extent of Invaliding.*

Sixteen non-commissioned officers and men were invalided during the year, being in the rate of 14·84 per 1,000 of the strength; this is 11·18 per 1,000 lower than in the preceding year. Ten men from the Command were discharged the service during the year, being in the rate of 9·29 per 1,000 of the strength, showing a reduction of 2·27 per 1,000 on the corresponding rate for 1876.

The classes and orders of diseases to which the invaliding of the year was *Ceylon*. due, are shown in the following Table:—

Strength, 1,077.	Invalids sent to England.	Invalids discharged the Service.
Diseases.		
<b>I. General Diseases.</b>		
Constitutional Group - - - -	—	—
Rheumatism - - - -	1	—
Syphilis - - - -	3	2
<b>II. Local Diseases.</b>		
Diseases of the—		
Nervous System - - - -	2	—
Circulatory „ - - - -	—	1
Absorbent „ - - - -	1	—
Digestive „ - - - -	5	4
Generative „ - - - -	—	1
<b>III. Debility.</b>		
	4	2
Total - - -	16	10
Ratio per 1,000 of mean strength - { 1877	14·84	9·29
1867-76	38·00	16·76

### Section III.

#### Mean Daily Sick.

The average number of non-commissioned officers and men (White Troops) constantly sick was 55·23.

The usual information calculated from this number is given in the following Table:—

	1877.	1867-76.
Ratio per 1,000 of strength constantly sick - -	51·28	50·07
Average sick time to each soldier - - -	Days. 18·72	Days. 18·03
Average duration of each case of sickness - -	19·11	17·69

The rate of constantly sick, and that of average sick time for each soldier, are only fractionally different from the corresponding rates of the preceding year, the average duration of each case of sickness, is lower by 6·13 days, a result which is no doubt due to the combined effects of two causes, the first being the greater prevalence of fevers in the present year, diseases usually of an acute character, the second the greater facilities for invaliding.

***Ceylon.***

#### Section IV.

### *On the Influence of Age on the Mortality.*

The death rates of the non-commissioned officers and men at the several ages, arranged in quinquennial periods, are shown in the following Table :—

Corps.	Under 20 Years.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
57th Foot - -	21	1	436	6	235	4	53	1	74	3	14	—
Ratio per 1,000 of the mean strength { 1877 - 9 years	47·62		13·76		17·02		18·87		40·54		—	
	3·22		12·62		21·5		19·00		30·00		127·00	

# XI.—ON THE HEALTH OF THE TROOPS SERVING IN CHINA AND THE STRAITS SETTLEMENTS.

## Section I.

### *Sickness and Mortality of the Troops in China and the Straits Settlements.*

#### STATISTICAL REPORT.

##### I.—White Troops.

In an average annual strength of 2,068 non-commissioned officers and men, there were 2,037 admissions into hospital, and (including those of invalids who died on board ship, or after arrival in England) 29 deaths; the average number of constantly sick was 88·81. The ratios given by these numbers are, for admissions 985·0, for deaths 14·02, and for constantly sick 42·94 per 1,000 of the strength, respectively. Compared with the preceding, the admission rate is lower in the present year by 24·7 per 1,000 men, the death-rate is lower by 2·20, but the constantly sick rate is higher by 1·61 per 1,000.

*China and Straits Settlements.*

The proportions in which the two divisions of the Command contributed to these results, are shown in the following Table:—

Stations.	Average Annual Strength.	Admitted into Hospital.	Died.	Invalided.	Average Daily Sick.	Ratio per 1,000 of Strength.				Average Sick time to each Soldier.	Average duration of each case of Sickness.
						Admitted.	Died.	Invalided.	Constantly Sick.		
Hong Kong - -	998	915	8	40	44·63	916·8	8·02	40·18	44·72	Days. 16·32	Days. 17·80
Straits Settlements -	1070	1122	21	38	44·18	1048·6	19·63	36·51	41·29	15·07	14·38

The admission rate for the Hong Kong division of the Command is one-third higher than that of the preceding year, a circumstance chiefly referable to the increased prevalence of paroxysmal fevers in the 28th Foot, consequent on its longer residence at the station; in 1876, the regiment then newly arrived having suffered comparatively little from this cause. The death rate for Hong Kong is also higher in the present year, but three-fourths of the deaths were from accidental drowning.

For the Straits Settlements division, most of the results of sickness are more favourable than those of the preceding year, the exception being that the invaliding rate is higher; both the general improvement, and the particular exception to it, are probably due to the same cause, namely the discontinuance in the present year of the field operations in which the Troops were engaged in 1876; a result of exposure in the field is the development of diseases which lead to eventual invaliding.



*China and  
Straits  
Settlements.*

The Troops stationed in the Command during the year, were detachments of Royal Artillery, and of Royal Engineers, the 10th, the 28th, the 74th, and 80th regiments, the first and last named, for a part of the year only. A few men of the Army Service, and Army Hospital Corps, and of the Garrison Staff, were also stationed in the Command.

The admissions and deaths in the various classes and orders of diseases are shown in the following Table:—

Order.	Strength - -	2,068.				Ratio per 1,000 of Mean Strength.			
		Admitted.	Died.			1877.		1869-76.	
			In the Command.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	<b>I. General Diseases.</b>								
1	Febrile Group - -	435	5	—	5	210·3	2·42	427·7	1·85
2	Constitutional Group -	191	1	—	1	92·3	·48	115·0	2·16
	<b>II.—Local Diseases.</b>								
	Diseases of the—								
1	Nervous System - -	23	4	1	5	11·1	2·42	19·7	1·23
2	Eye - - - - -	17	—	—	—	8·2	—	19·4	—
3	Ear - - - - -	33	—	—	—	16·0	—	11·9	—
4	Nose - - - - -	—	—	—	—	—	—	·5	—
5	Circulatory System -	77	2	—	2	37·2	·97	22·7	1·38
6	Absorbent - - - -	27	—	—	—	13·1	—	17·0	—
7	Ductless Glands - -	—	—	—	—	—	—	—	—
8	Respiratory System -	85	2	1	3	41·1	1·45	49·6	1·08
9	Digestive System - -	394	2	3	5	190·5	2·42	272·4	4·23
10	Urinary „ - - - -	203	—	—	—	98·2	—	83·1	·16
11	Generative „ - - -	44	—	—	—	21·3	—	19·7	—
12	Organs of Locomotion -	3	—	—	—	1·5	—	4·5	·08
13	Cellular Tissue - -	88	—	—	—	42·6	—	26·6	—
14	Cutaneous System - -	154	—	—	—	74·5	—	92·7	—
	<b>III.—Conditions, &amp;c.</b>								
	Debility - - - - -	48	—	1	1	23·2	·48	26·0	·23
	<b>IV.—Poisons.</b>	17	1	—	1	8·2	·48	12·2	1·00
	<b>V.—Injuries.</b>								
1	Battle - - - - -	—	—	—	—	—	—	2·8	·16
2	Accidental - - - -	189	6	—	6	91·3	2·90	103·1	·77
3	Homicidal - - - - -	—	—	—	—	—	—	·1	·16
4	Self inflicted - - -	1	—	—	—	·5	—	·3	·08
5	Judicial - - - - -	—	—	—	—	—	—	·2	—
	<b>VI.—Surgical Operations.</b>	—	—	—	—	—	—	·4	—
	No appreciable disease -	8	—	—	—	3·9	—	2·5	—
	<b>Total - - - - -</b>	2,037	23	6	29	985·0	14·02	1330·1	14·57
	<b>Average of 10 years, } 1867-76 - - - - }</b>	—	—	—	—	1338·4	15·33	—	—

**GENERAL DISEASES.**—The rate of admissions is lower than in the preceding year by 35·3 per 1,000 men, the whole of the reduction being in the *febrile group*, the rate of the *constitutional group*, is a fourth higher. The death rate of the *febrile group* is 1·26 per 1,000 men higher than in 1876, that of the *constitutional* is fractionally lower.

The admissions and deaths from the principal diseases in this class are shown in the following table:—

*China and  
Straits  
Settlements.*

General Diseases.	Admitted.	Died.	Ratio per 1,000.			
			1877.		1869-76.	
			Admitted.	Died.	Admitted.	Died.
<i>Febrile Group—</i>						
Eruptive Fevers	7	—	3·4	—	1·3	·08
Continued „	132	4	63·8	1·94	120·4	1·23
Paroxysmal „	293	—	141·6	—	301·2	·38
Cholera	2	1	1·0	·48	·2	·16
Influenza	—	—	—	—	2·6	—
Erysipelas	1	—	·5	—	1·5	—
Other Diseases	—	—	—	—	·5	—
Total	435	5	210·3	2·42	427·7	1·85
<i>Constitutional Group—</i>						
Rheumatism	62	—	30·0	—	38·1	·08
Syphilis	98	—	47·3	—	65·0	·16
Scrofula, Phthisis, &c.	29	1	14·0	·48	8·5	1·69
Scurvy and Purpura	—	—	—	—	·3	—
Anæmia	1	—	·5	—	1·5	—
Other Diseases	1	—	·5	—	1·6	·23
Total	191	1	92·3	·48	115·0	2·16

*Eruptive Fevers.*—The admissions were from small-pox (1) and from measles (6).

*Continued Fevers.*—The rate of admissions is lower than in the preceding year by 30·4 per 1,000 men, but with this is associated an increase of 1·17 per 1,000 in the rate of mortality. *Enteric Fever.*—Of the three admissions, two were those of men of the 28th regiment, at Hong Kong, and one was that of a man of the 74th regiment, at Malacca; all the attacks were fatal. *Simple continued Fever.*—Of the 41 admissions, 1 only is returned from Hong Kong; more than half of the whole number occurred at Singapore, the fatal case (respecting which no details are given in the report) was that of a man of the 74th regiment, at Qualla Kangsa. *Febricula.*—Of the 88 admissions for this form of fever, 49 took place at Hong Kong, and they are stated to have probably been due to errors in diet, or to drink, and not to climatic influences.

*Paroxysmal Fevers.*—The rate of admissions is 20·6 per 1,000 men lower than that of the preceding year; more than two-thirds of the admissions are returned from Hong Kong, where the prevalence of fevers of this nature in 1876 was inconsiderable; in the force stationed there, the greatest incidence was in a small body of men temporarily stationed at Kowloon. With respect to the admissions for *ague* at Singapore, the Medical Officer remarks that nearly all those attacked at that place (which is usually very free from fevers of this kind) were men who had acquired malarial fever, when on field service at Perak, in the preceding year.

*Cholera.*—Both of the admissions for this disease were at Singapore.

*Rheumatism.*—The rate of admissions is 3·2 per 1,000 men lower than in 1876.

*Syphilis.*—The rate of admissions is 14·4 per 1,000 men higher than in the preceding year.

*China and  
Straits  
Settlements.*

*Scrofula, Phthisis, &c.*—The rate of admissions is 8·2 per 1,000 men higher than in the preceding year, a more than twofold increase; diseases of this kind were disproportionately frequent in the Singapore division of the Command, and the Medical Officer at Tanglin remarks, that phthisis in some instances seemed to be a sequel to repeated attacks of ague.

*LOCAL DISEASES.—Diseases of the Nervous System.*—The rate of admissions is 14·5 per 1,000 men lower than in the preceding year, a two-fold decrease, but this is accompanied by an increase of 1·26 per 1,000 in the rate of mortality, a result due to the more frequent occurrence of fatal attacks of apoplexy, and of sunstroke.

*Diseases of the Eye.*—The rate of admissions is lower than that for 1876 by 4·2 per 1,000 men.

*Diseases of the Circulatory System.*—The rate of admissions exceeds that of the preceding year by 14 per 1,000 men, an increase due to the greater frequency of palpitation.

*Diseases of the Respiratory System.*—The rate of admissions exceeds that of the preceding year by 4 per 1,000 men; the death rate is fractionally lower.

*Diseases of the Digestive System.*—Compared with that of the preceding year the rate of admissions shows the large decrease of 83·7 per 1,000 men, a result chiefly due to the cessation of field operations; with this there is a decrease of 6·08 per 1,000 men, or two-thirds, in the rate of deaths.

*Diseases of the Urinary System.*—The rate of admissions is 34·5 per 1,000 men higher than in 1876.

*CONDITIONS, &c.—Debility.*—The rate of admissions is lower than that of the preceding year by 13·1 per 1,000 men.

*POISONS.*—The rate of admissions is a little higher than in 1876, no doubt this is connected with the return of men from the field.

*INJURIES.—Accidental.*—The rate of admissions is 19·1 per 1,000 men lower than in 1876; the death rate is 2·13 per 1,000 higher, a fourfold increase. All the deaths were due to drowning.

*Officers.*

In an average annual strength of 98 officers there were 50 attacks of illness, being in the rate of 510·2 per 1,000 men; no officer died during the year, but 7 were invalided to England (being in the rate of 71·43 per 1,000 of the strength), one on account of remittent fever, one for phthisis, one for retinitis, one for dysentery, two for debility, and one for an accidental injury.

*Women.*

In an average annual strength of 134 women, the wives of non-commissioned officers and men, there were 73 attacks of illness, and (in the Command) 6 deaths, being in the rates of 544·8, and of 44·78 per 1,000 of the strength respectively. The deaths were due to remittent fever (2), cholera (1), dyspepsia (1), meningitis (1), apoplexy (1).

*Children.*

In an average annual strength of 241 children of non-commissioned officers and men, there were 117 attacks of illness, and (in the Command) 13 deaths, being in the rates of 485·5, and of 53·94 per 1,000 of the strength respectively. Of the attacks 43 were of measles; no other form of eruptive fever is returned. The deaths were due to remittent fever (1), cholera (1), convulsions (3), congestion of lungs (1), diarrhoea (3), debility (3), drowning (1).

## 2. ASIATIC TROOPS.

The Asiatic Troops in the Command consisted of a company of Gun Lascars stationed at Hong Kong, having an average annual strength of 85 non-commissioned officers and men. The admissions into hospital were 58, being in the rate of 682·4 per 1,000 men. There was 1 death, being in the rate of 11·77 per 1,000 men. No soldier was invalided. The average number of constantly sick was 2·49, being in the rate of 29·30 per 1,000 men. A third of the admissions were for ague, a majority of the others were for venereal diseases. The death was from apoplexy.

## Section II.

### *On the Extent of Invaliding.*

**China and  
Straits  
Settlements.**

The diseases which caused invaliding are shown in the following table:—

	White Troops.	
Mean Strength	2,068.	
Disabilities.	Sent to England as Invalids.	Discharged as Invalids.
Ague	2	—
Rheumatism	3	1
Phthisis	17	11
Meningitis	1	—
Softening of the Brain	—	1
Palsy	1	1
Dementia	1	—
Pericarditis	3	—
Valve disease of the Heart	16	6
Hypertrophy	1	1
Palpitation	4	2
Varicose Veins	—	1
Bronchitis	2	1
Pleurisy	4	—
Asthma	1	—
Splenitis	—	1
Dysentery	8	2
Diarrhœa	2	—
Hepatitis	6	1
Hæmorrhoids	1	—
Hæmorrhage from Rectum	1	—
Eczema	2	—
Ulcer	—	1
Debility	6	4
Gunshot wound (battle)	—	2
Fracture	1	1
Total	78	37
Annual ratio per 1,000 of mean strength { 1877	37·72	17·89

The rate of primary invaliding is 14·16 per 1,000 men higher than in the preceding year; that of final invaliding much higher.

### Section III.

**Mean Daily Sick.**

The average number constantly sick of the European Troops was 88·81, and of the Asiatic Troops 2·49.

From these numbers the following particulars have been calculated :—

	European Troops.	Asiatic Troops.
Ratio per 1,000 of strength con-		
stantly sick - - - { 1877 -	42·94.	29·30
- - - { 1867-76 -	50·25	41·76
	Days.	Days.
Average sick time to each sol-		
dier - - - { 1877 -	15·68	10·70
- - - { 1867-76 -	18·57	15·20
Average duration of each case { 1877 -	15·91	15·67
of sickness - - - { 1867-76 -	13·87	14·24

*China and  
Straits  
Settlements.*

As respects White Troops, the constantly sick rate is 1·61 per 1,000 men higher than in the preceding year; the average sick time to each soldier, and the average duration of each case of sickness, are each fractionally higher.

#### Section IV.

##### *Influence of Age on the Mortality.*

The ages of the White Troops in quinquennial periods, and the deaths in each group of ages, are shown in the following table :—

Corps.	Under 20 Years.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.	
	Average Strength.	Died.	Average Strength.	Died.	Average Strength.	Died.	Average Strength.	Died.	Average Strength.	Died.	Average Strength.	Died.
Total - -	62	1	873	6	667	4	386	5	223	6	46	1
Annual ratio per { 1877 - 1,000 of strength { 1873-76 -	16·12 —		6·87 6·52		6·00 13·63		12·95 17·17		26·91 24·32		21·73 31·25	

## XII.—ON THE HEALTH OF THE TROOPS SERVING IN THE FIJI ISLANDS.

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### Section I.

#### *Sickness and Mortality.*

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#### STATISTICAL REPORT.

The force in this Command consisted of the 6th Company of Royal Engineers from the 1st of January to the 30th of November, having an average annual strength of 48 non-commissioned officers and men; the admissions into hospital were 29, being in the rate of 604·2 per 1,000 men. No death occurred. 8 men were invalided, being in the rate of 166·7 per 1,000. The average number constantly sick was 1·63, being in the rate of 33·96 per 1,000 men. *Fiji Islands.*

The admissions for diseases of the *digestive system* were nearly two-thirds of the whole number.

The invaliding was due to meningitis (1), hepatitis (4), debility (3).

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## XIII.—ON THE HEALTH OF THE TROOPS SERVING IN INDIA.

## Section I.

*Sickness and Mortality.**India.*

The average annual strength of the non-commissioned officers and men in India was 57,821; the admissions into hospital were 71,285, and the deaths 795, of which 731 took place in India, and 64 (being those of invalids) on the passage or after arrival in England. The average number of constantly sick was 3,090. The rates from these numbers are, for admissions 1,233, for deaths 13·75, and for constantly sick 53·44 per 1,000 of the strength.

The sickness for each of the three Commands is shown in the following Table:—

	Average Annual Strength.	Admitted into Hospital.	Deaths.			Invalids.	Constantly sick.	Ratio per 1,000 of Mean Strength.				Average Sick time to each Soldier.	Average duration of each case of Sickness.
			In India.	Of Invalids.	Total.			Admitted.	Died.	Invalids.	Constantly sick.		
Bengal -	36,666	45,006	422	38	460	1,425	1,924	1227·5	12·55	38·86	52·47	Days. 19·15	Days. 15·80
Madras	11,016	12,591	188	16	204	510	593	1143·0	18·52	46·30	53·83	19·65	17·19
Bombay	10,139	13,688	121	10	131	400	573	1350·0	12·92	48·23	56·51	20·63	15·28
Total -	57,821	71,285	731	64	795	2,425	3,090	1232·9	13·75	41·94	53·44	19·51	15·82

## 1.—BENGAL.

## STATISTICAL REPORT.

*Bengal.*

The Principal Medical Officer's returns show that in an average strength of 36,666 non-commissioned officers and men, there were 45,006 admissions into hospital, 422 deaths, and 1,924 men constantly sick. If to the deaths enumerated above, those of 38 invalids, who died either on the voyage home or after their arrival in England, are added, the total for this Presidency reaches 460. The admission rate is therefore 1227·5, that of the deaths 12·55, and of the

constantly sick 52·47 per 1,000 of the strength, being respectively 185·3, *Bengal*. 4·00, and 2·99 lower than in 1876.

The admissions and deaths in the different classes of diseases are shown in the following Table :—

Orders.	Diseases.	Strength 36,666.				Ratio per 1,000 of Mean Strength.			
		Admitted.	Deaths.			1877.		1869-76.	
			In the Command.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
<i>General Diseases.</i>									
1	Febrile Group -	15,005	99	1	100	409·2	2·73	618·9	8·07
2	Constitutional Group -	4,904	45	14	59	133·7	1·61	157·5	2·14
<i>Local Diseases.</i>									
1	Nervous System -	772	57	1	58	21·1	1·58	20·4	2·36
2	Eye -	559	—	—	—	15·2	—	22·7	—
3	Ear -	337	—	—	—	9·2	—	7·5	—
4	Nose -	27	—	—	—	·7	—	·6	·01
5	Circulatory System -	763	35	8	43	20·8	1·17	20·3	1·48
6	Absorbent „	471	—	—	—	12·8	—	15·1	} ·01
7	Ductless Glands -	6	2	—	2	·2	·05	·1	
8	Respiratory System -	1,914	22	1	23	52·2	·63	57·8	1·17
9	Digestive „	7,330	91	10	101	199·1	2·76	242·7	5·15
10	Urinary „	4,480	5	2	7	122·2	·19	104·2	·33
11	Generative „	530	—	—	—	15·5	—	14·8	—
12	Organs of Locomotion -	171	2	1	3	4·7	·08	5·1	·05
13	Cellular Tissue -	503	—	—	—	13·7	—	12·8	·03
14	Cutaneous System -	2,387	—	—	—	65·1	—	66·9	·01
<i>III. Conditions, &amp;c.</i>									
	Debility -	915	—	—	—	24·9	—	19·3	·10
<i>IV. Poisons.</i>									
		139	9	—	9	3·8	·25	4·3	·27
<i>V. Injuries.</i>									
1	Battle -	2	—	—	—	·1	—	—	—
2	Accidental -	3,711	32	—	32	101·2	·87	87·7	·82
3	Homicidal -	5	4	—	4	·1	·11	} ·3	·62
4	Self-inflicted -	11	16	—	16	·3	·44		
5	Judicial -	2	3	—	3	·1	·08		
<i>VI. Surgical Operations.</i>									
		23	—	—	—	·6	—	·4	·02
	Not specified -	4	—	—	—	·1	—	·1	·01
	No appreciable Disease	35	—	—	—	·9	—	·8	—
	Total -	45,006	422	38	460	1227·5	12·55	1480·3	22·65
	Average of 10 years, 1866-75 -	—	—	—	—	1463·6	23·75	—	—



Bengal.

**GENERAL DISEASES.**—When compared with last year's returns a decrease is observed in both the admission and death rates for this class. In the *febrile group* the ratios are 168·4 and 2·87 lower than in 1876, and in the *constitutional group* the decrease amounts to 10·1 and ·11 per 1,000 of the strength.

The admissions and deaths from the principal diseases of this class are shown in the following Table :—

Strength, 36,666.					Ratio per 1,000 of Mean Strength.			
General Diseases.			Admitted.	Died.	1877.		1869-76.	
					Admitted.	Died.	Admitted.	Died.
<i>Febrile Group.</i>								
Eruptive Fevers	-	-	71	1	1·9	·03	4·2	·17
Continued „	-	-	4,854	59	132·4	1·61	168·2	1·98
Paroxysmal „	-	-	9,973	21	272·0	·57	435·9	1·43
Cholera	-	-	19	16	·5	·44	6·3	4·33
Influenza	-	-	30	—	·8	—	1·2	—
Erysipelas	-	-	46	3	1·3	·08	2·4	·09
Other diseases	-	-	12	—	·3	—	·7	·07
Total	-	-	15,005	100	409·2	2·73	618·9	8·07
<i>Constitutional Group.</i>								
Rheumatism	-	-	1,682	2	45·9	·05	52·5	·02
Syphilis	-	-	2,840	5	77·4	·14	88·0	·11
Scrofula, Phthisis, &c.	-	-	282	45	7·7	1·23	10·3	1·78
Scurvy and Purpura	-	-	5	—	·1	—	·5	·02
Anæmia	-	-	85	2	2·3	·05	5·5	·05
Other diseases	-	-	10	5	·3	·14	·7	·16
Total	-	-	4,904	59	133·7	1·61	157·5	2·14

*Eruptive Fevers.*—There is a very considerable reduction in the admission rate for these fevers, owing to the subsidence of the epidemic of *dengue fever* which prevailed in 1876. The number of men admitted into hospital for this disease was 34, while in the previous year there were 668 admissions. For *small-pox* there were 20 admissions, the number for 1876 being 6; for *measles* there were 16, and for *scarlet fever* 1. The only death was from *small-pox*.

*Continued fevers* show a lower admission rate than in the previous year by 13·8, and a lower death rate by ·28. Of 59 deaths, 55 were due to *enteric fever* and 4 to *simple continued fever*.

*Paroxysmal fevers* were much less prevalent than in 1876; the reduction in the admission rate amounts to 133·3 per 1,000 of the strength.

*Cholera* did not appear in an epidemic form; the rates both of admissions and deaths were consequently much lower than in the previous year.

*Erysipelas* shows lower admission and death rates.

*Rheumatism* was less prevalent, but there were two deaths.

*Syphilis* shows a lower admission rate by 2·8 per 1,000 of the strength, but the death rate is fractionally higher than it was last year.

*Scrofula and Phthisis*.—The admission and death rates were a trifle below those of the preceding year.

**LOCAL DISEASES.**—The admission rates are lower for all the groups, except for *diseases of the ear, ductless glands, urinary and generative systems*, and of the *cellular tissue*, for which they are higher. The death rates, except for diseases of the *circulatory system, ductless glands, and organs of locomotion*, are also below those of 1876.

**CONDITIONS.**—*Debility* shows an admission rate almost the same as for last year.

**POISONS.**—The admission and death rates are respectively ·2 and ·09 higher than in the preceding year.

**INJURIES.**—*Battle*.—Two men were, during the Jowaki expedition, admitted for gunshot wounds. There were no deaths. The admission rate for *accidents* was higher by 5·4 per 1,000 of the strength than in 1876, and the death rate also shows an increase of ·28. There were, in all, 32 deaths in this group; of these 1 man was killed by lightning, 10 were drowned, 5 were “asphyxiated by plugging of the air passages,” 3 died from concussion of the brain, 6 from fracture of the skull, 1 from fracture (the nature of which was not specified), 2 from gunshot wounds, 2 from rupture of the bladder, 1 from rupture of an artery (the vessel was not named), and 1 from injury to a cerebral vessel.

The *homicidal* deaths were all from gunshot wounds.

The *suicidal* deaths were 16 in number, 12 from gunshot wounds, 1 from cut throat, 2 from drowning, and 1 from strangulation.

The admissions and deaths which took place at the chief stations in the Command, are shown in the following Table:—

Stations.		Average Annual Strength.	Admitted into Hospital.	Died in India.	Ratio per 1,000 of Strength.		Ratio per 1,000 of Strength, 1866-76.		
					Admitted.	Died.	Admitted.	Died.	
Presidency	{ Calcutta	-	831	710	11	854·4	13·24	1200·5	14·86
	{ Dum-Dum	-	646	777	4	1218·3	6·20	1125·0	19·65
	{ Barrackpore	-	394	847	2	2150·0	5·08	1880·3	27·18
	{ Hazaribagh	-	104	93	—	394·2	—	1133·5	15·50
	{ Darjeeling	-	54	87	—	1611·1	—	1023·6	9·17
Allahabad	{ Allahabad	-	904	1,140	12	1261·0	13·27	1726·3	30·32
	{ Dinapore	-	803	1,031	14	1284·0	17·43	1472·7	22·76
	{ Benares	-	518	1,068	16	2063·0	31·47	1505·0	20·21
	{ Chunar	-	67	127	1	1895·5	14·93	*2204·0	36·90
	{ Cawnpore	-	868	770	17	887·1	19·59	1615·7	24·15

\* 7 years only.

*Bengal.*

Stations.		Average Annual Strength.	Admitted into Hospital.	Died in India.	Ratio per 1,000 of Strength.		Ratio per 1,000 of Strength, 1866-76.	
					Admitted.	Died.	Admitted.	Died.
Oudh	Lucknow	2,269	2,807	24	1237.0	10.58	1290.2	24.02
	Fyzabad	937	1,074	8	1146.0	8.54	1197.8	21.54
	Sitapur	567	918	6	1619.0	10.58	1129.0	17.67
Rohileund	Bareilly	735	653	10	888.4	13.66	985.5	10.87
	Shahjehanpur	423	388	7	917.3	16.55	1119.5	21.03
	Moradabad	222	169	2	716.2	9.01	994.8	17.64
	Ranikhet	1,143	886	5	775.2	4.87	*973.8	15.85
Saugor	Jubbulpore	491	736	3	1499.0	6.11	1435.2	25.49
	Saugor	381	483	7	1267.7	18.37	1792.6	25.88
	Nowgong	268	323	5	1205.2	18.66	1701.6	23.74
Gwalior	Morar	1,051	1,128	12	1073.3	11.42	1578.2	25.86
	Fortress Gwalior	369	395	7	1070.5	18.97	1292.4	25.51
	Jhansi	390	345	5	884.7	12.82	2611.2	17.21
Meerut	Meerut	1,415	1,720	15	1215.7	10.60	1726.6	34.57
	Fatehgarh	225	242	3	1075.6	13.33	1286.0	15.43
	Agra	847	991	21	1170.0	24.80	1200.6	15.36
	Muttra	371	232	—	625.3	—	1081.5	17.23
	Delhi	430	567	9	1318.6	20.98	1974.1	27.71
	Roorkee	441	396	3	898.0	6.80	1432.0	21.49
	Chakrata	669	311	4	466.3	6.00	†761.1	9.57
Sirhind	Umballa	1,281	2,055	11	1604.2	8.59	1402.7	17.49
	Jullundur	715	806	7	1127.3	9.79	1509.2	21.76
	Subathu	752	717	10	953.5	13.80	1009.2	17.15
	Dagshai	889	787	5	885.3	5.62	1000.3	10.26
	Solun	193	149	1	772.1	5.18	†1174.5	14.37
	Jutogh	81	61	1	753.1	12.10	†759.2	15.71
Lahore	Meen Meer	1,010	2,593	19	2567.3	18.81	2431.3	40.69
	Fort Lahore	149	282	6	1892.6	40.27	2370.0	35.48
	Amritsar	143	231	—	1615.4	—	†2082.8	32.92
	Fort Govindgarh.	140	227	3	1621.4	21.44	1808.4	17.32
	Ferozepore	1,005	1,470	14	1462.7	13.93	1334.0	17.05
	Mooltan	682	1,093	3	1602.7	4.40	1522.2	16.95
	Fort Kangra	42	66	—	1571.4	—	1241.8	21.13
	Bhagsu	59	148	—	2508.5	—	§1061.4	11.52
	Banikhet	55	135	—	2454.5	—	981.3	3.67
	Dalhousie	—	—	—	—	—	¶978.9	7.55
Rawal Pindi	Rawal Pindi	1,700	2,321	20	1365.3	11.76	1456.3	13.64
	Sialkot	1,059	1,708	18	1608.1	17.00	1418.7	14.01
	Campbellpore	147	165	2	1122.5	13.61	1340.7	16.82
	Fort Attock	172	362	3	2104.7	11.62	2125.4	22.43
	Dera Ismail Khan.	100	164	1	1640.0	10.00	1818.0	16.18
	Kooldunnah	117	131	1	1119.6	8.55	1006.7	6.75
	Khyra Gully	44	80	—	1818.2	—	176.2	9.52
	Bara Gully	72	66	—	916.7	—	248.8	14.78
	Chungla Gully	88	178	—	2022.7	—	175.4	12.70
	Kalabagh	97	125	—	1288.7	—	1903.7	6.88
	Camp Ghareal	139	171	1	1230.1	7.20	†707.0	27.91

\* 6 years only.

† 8 years only.

‡ 3 years only.

§ 7 years only.

|| 4 years only.

¶ 5 years only.

*Bengal.*

Stations.	Average Annual Strength.	Admitted into Hospital.	Died in India.	Ratio per 1,000 of Strength.		Ratio per 1,000 of Strength, 1866-76.	
				Admitted.	Died.	Admitted.	Died.
Peshawar - { Peshawar -	1,247	2,202	5	1757·8	4·01	2681·2	45·66
Nowshera -	862	1,153	5	1337·6	5·80	2255·4	19·89
Cherat -	384	310	5	807·3	13·02	1515·4	20·21
Camps of exercise, and Troops marching -	1,298	1,115	8	851·3	6·16 {	*820·4	3·90
						840·2	16·85
Troops treated at convalescent depôts, and other hospitals.	1,567	2,486	24	1586·5	15·32	1656·0	37·54
Troops on field service -	74	54	—	730·0	—	—	—

The station of Meen Meer shows the highest rate of admissions into hospital, in the present, as in the preceding year, the rate for which is exceeded by 11 per 1,000 men; the prevalence of paroxysmal fevers amongst the troops generally caused the high admission rate of the station. The rate for the station of Peshawar is only fractionally different from that of 1876, and it shows an important reduction on that of the average of 10 years, a result no doubt due, in a large measure, to the policy recently adopted of diminishing the risk of sickness by a transference of a considerable part of the garrison to a more healthy residence during the summer and autumn. The rate of admissions for Calcutta is very favourable, being 82 per 1,000 less than the low rate of the preceding year, the death rate, however, is 6·05 per 1,000 men higher.

\* 4 years only.

*Bengal.*

The admissions and deaths in the different classes and orders of diseases

Order.	Stations - - - -	Pre-sidency.		Allaha-bad.		Oudh.		Rohil-cund.		Saugor.	
		2,028		3,178		3,773		2,522		1,148	
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class of Diseases										
	<b>I. General Diseases.</b>										
1	Sub-division A. - - - -	939	2	1,054	12	1,118	8	262	4	448	4
2	„ B. - - - -	245	3	605	6	495	3	531	1	234	1
	<b>II. Local Diseases.</b>										
	Diseases of the—										
1	Nervous System - - - -	45	1	80	6	103	5	25	5	25	—
2	Eye - - - -	20	—	54	—	87	—	45	—	16	—
3	Ear - - - -	17	—	22	—	58	—	8	—	6	—
4	Nose - - - -	—	—	2	—	2	—	2	—	—	—
5	Circulatory System - - -	50	2	43	8	115	5	49	5	8	1
6	Absorbent - - - -	29	—	111	—	70	—	22	—	37	—
7	Ductless Glands - - - -	—	—	—	—	2	—	—	—	—	—
8	Respiratory System - - -	77	1	129	1	173	—	75	—	79	4
9	Digestive „ - - - -	371	3	711	15	921	8	346	7	196	3
10	Urinary „ - - - -	280	—	546	1	552	1	299	—	154	—
11	Generative „ - - - -	43	—	76	—	57	—	19	—	27	—
12	Organs of Locomotion - -	4	—	15	2	7	—	14	—	10	—
13	Cellular Tissue - - - -	27	—	42	—	71	—	26	—	25	—
14	Cutaneous System - - - -	103	—	266	—	363	—	109	—	124	—
	<b>III. Debility</b> - - - -	87	—	80	—	141	—	32	—	18	—
	<b>IV. Poisons</b> - - - -	12	—	11	1	24	1	13	1	11	—
	<b>V. Injuries.</b>										
1	Battle - - - -	—	—	—	—	—	—	—	—	—	—
2	Accidental - - - -	167	2	291	3	431	5	213	1	121	1
3	Homicidal - - - -	1	—	—	1	—	—	—	—	—	—
4	Self-inflicted - - - -	—	3	2	3	1	3	—	—	—	1
5	Judicial - - - -	—	—	—	1	—	—	—	—	—	—
	<b>VI. Surgical Operations</b> -	1	—	3	—	3	—	—	—	3	—
	No appreciable Disease - -	1	—	7	—	5	—	—	—	—	—
	Not known - - - -	—	—	1	—	1	—	1	—	—	—
	<b>General Total</b> - - - -	2,519	17	4,151	80	4,800	39	2,091	24	1,542	15

in each of the Military Divisions are shown in the following Table:—

*Bengal.*

Gwalior.		Meerut.		Sirhind.		Lahore.		Rawal Pindi.		Peshawar.		Camp of Exercise and Troops on March.		Field Service.		Con-valescent Depôts.	
1,810		4,354		3,929		3,284		3,733		2,494		2,236		84		1,560	
Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
468	8	1,102	14	1,160	12	3,551	9	1,564	14	2,031	3	495	2	19	—	916	3
223	1	482	5	443	3	331	10	557	1	172	—	283	2	10	—	320	4
42	2	86	11	98	9	90	7	107	5	40	4	15	2	—	—	56	—
17	—	64	—	68	—	55	—	68	—	32	—	16	—	—	—	28	—
18	—	50	—	50	—	37	—	38	—	28	—	5	—	—	—	6	—
4	—	—	—	4	—	6	—	2	—	2	—	1	—	—	—	2	—
35	1	74	4	119	3	61	2	148	3	24	1	17	1	—	—	38	—
17	—	33	—	25	—	29	—	32	—	27	—	17	—	—	—	18	—
1	1	—	—	2	—	—	—	—	—	—	—	—	—	—	—	1	1
63	2	200	1	185	—	254	2	380	8	122	—	114	2	5	—	104	2
391	5	882	15	1,050	4	634	7	756	9	430	5	276	1	10	—	511	10
194	—	474	1	409	—	358	1	448	1	254	—	324	—	3	—	190	1
17	—	61	—	36	—	33	—	77	—	30	—	22	—	2	—	32	—
1	—	24	—	18	—	14	—	30	—	9	—	11	—	—	—	12	—
24	—	73	—	70	—	51	—	30	—	30	—	20	—	—	—	16	—
135	—	275	—	318	—	269	—	248	—	92	—	66	—	1	—	59	—
56	—	100	—	47	—	120	—	128	—	55	—	16	—	—	—	52	—
1	—	9	—	10	—	23	3	18	1	11	—	—	—	—	—	6	2
—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—
152	2	473	3	473	3	351	1	529	3	250	1	185	4	2	—	109	—
—	—	1	—	2	—	—	1	—	—	—	—	—	—	—	—	—	—
1	—	2	1	1	2	3	1	2	1	1	1	1	—	—	—	1	1
—	—	—	—	—	—	—	1	3	—	—	—	—	—	—	—	—	—
4	—	—	—	—	—	5	—	3	—	1	—	1	—	—	—	2	—
—	—	1	—	2	—	2	—	3	—	2	—	—	—	—	—	7	—
1	—	3	—	2	—	—	—	—	—	2	—	—	—	—	—	—	—
1,865	22	4,469	55	4,592	36	6,277	45	5,471	46	3,645	15	1,884	15	54	—	2,486	24

Bengal.

Ratio per 1,000

Order.	Stations - - - -	Pre-sidency.		Allaha-bad.		Oudh.		Rohil-cund.		Saugor.	
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	<b>I. General Diseases.</b>										
1	Sub-division A. - - -	463·0	·99	331·6	3·78	296·3	2·12	103·9	1·53	390·3	3·48
2	" B. - - -	120·8	1·48	190·4	1·89	131·2	·79	210·5	·40	203·8	·87
	<b>II. Local Diseases.</b>										
	Diseases of the—										
1	Nervous System - - -	22·2	·40	25·2	1·89	27·3	1·33	9·8	1·08	21·6	—
2	Eye - - - -	9·9	—	17·0	—	23·0	—	17·8	—	13·9	—
3	Ear - - - -	8·4	—	6·9	—	15·4	—	3·2	—	5·2	—
4	Nose - - - -	—	—	·6	—	·5	—	·8	—	—	—
5	Circulatory System - -	24·7	·09	13·5	2·52	30·5	1·33	10·4	1·08	7·0	·87
6	Absorbent - - - -	14·3	—	34·9	—	18·5	—	8·7	—	32·2	—
7	Ductless Glands - - -	—	—	—	—	·5	—	—	—	—	—
8	Respiratory System - -	38·0	·40	40·6	·31	45·9	—	29·7	—	68·8	3·48
9	Digestive " - - -	192·0	1·48	223·8	4·72	244·1	2·12	137·1	2·77	170·7	2·62
10	Urinary " - - -	138·0	—	171·9	·31	146·3	·27	118·6	—	134·2	—
11	Generative " - - -	21·2	—	23·9	—	15·1	—	7·6	—	23·5	—
12	Organs of Locomotion -	2·0	—	4·7	·63	1·9	—	6·3	—	8·7	—
13	Cellular Tissue - - -	13·3	—	13·2	—	18·8	—	10·0	—	21·8	—
14	Cutaneous System - - -	50·8	—	83·6	—	96·2	—	43·2	—	103·0	—
	<b>III. Debility</b> - - -	42·9	—	25·2	—	37·4	—	12·6	—	15·7	—
	<b>IV. Poisons</b> - - -	5·0	—	3·5	·31	6·4	·27	5·1	·40	9·6	—
	<b>V. Injuries.</b>										
1	Battle - - - -	—	—	—	—	—	—	—	—	—	—
2	Accidental - - - -	82·3	·99	91·6	·95	114·2	1·33	84·4	·40	105·4	·87
3	Homicidal - - - -	·5	—	·31	—	—	—	—	—	—	—
4	Self-inflicted - - - -	—	1·48	·6	·95	·3	·79	—	—	—	·87
5	Judicial - - - -	—	—	·31	—	—	—	—	—	—	—
	<b>VI. Surgical Operations</b>	·5	—	·9	—	·8	—	—	—	2·6	—
	No appreciable Disease -	·5	—	2·2	—	1·3	—	—	—	—	—
	Not known - - - -	—	—	·3	—	·3	—	·4	—	—	—
	<b>General Total</b> - - -	1242·1	8·39	1306·1	18·88	1272·2	10·35	829·1	9·51	1343·2	13·06

of Mean Strength.

Bengal.

Gwalior.		Meerut.		Sirhind.		Lahore.		Rawal Pindi.		Peshawur.		Camp of Exercise and Troops on March.		Field Service.		Con-valescent Depôts.	
Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
258'5	4'42	253'2	3'22	295'2	3'08	1081'3	2'74	499'3	3'75	814'4	1'20	221'4	'89	226'2	—	587'2	1'92
123'2	'55	110'7	1'15	112'8	'78	101'1	3'05	149'2	'27	69'0	—	126'6	'89	119'1	—	205'1	2'56
23'2	1'10	19'8	2'53	24'9	2'30	27'4	2'14	28'7	1'34	16'0	1'60	6'7	'89	—	—	35'8	—
9'4	—	14'7	—	17'3	—	17'3	—	18'2	—	12'8	—	7'2	—	—	—	18'0	—
9'9	—	11'5	—	12'7	—	11'3	—	10'2	—	11'2	—	2'2	—	—	—	3'9	—
2'2	—	—	—	1'0	—	1'8	—	'5	—	'8	—	'4	—	—	—	1'3	—
19'3	'55	17'0	'92	30'3	'78	18'5	'61	39'7	'80	9'6	'40	7'6	'45	—	—	24'4	—
9'4	—	7'6	—	6'4	—	8'8	—	8'6	—	10'8	—	7'6	—	—	—	11'5	—
'6	'55	—	—	'5	—	—	—	—	—	—	—	—	—	—	—	'5	'64
34'8	1'10	45'9	'23	47'1	—	77'3	'61	101'8	2'14	48'9	—	51'0	'89	59'5	—	66'7	1'28
216'0	2'77	202'5	3'44	267'2	1'02	193'1	2'14	202'5	2'41	172'4	2'01	123'5	'45	119'1	—	327'5	6'42
107'2	—	108'8	'23	104'1	—	109'0	'30	120'0	'27	101'9	—	144'9	—	35'7	—	121'8	'64
9'4	—	14'0	—	9'1	—	10'0	—	20'6	—	12'0	—	9'8	—	23'8	—	20'5	—
'6	—	5'5	—	4'6	—	4'3	—	8'1	—	3'6	—	4'9	—	—	—	7'7	—
13'3	—	16'8	—	18'0	—	15'5	—	8'1	—	12'0	—	8'9	—	—	—	10'3	—
74'5	—	63'1	—	80'9	—	81'3	—	66'4	—	36'9	—	29'5	—	11'9	—	37'8	—
30'9	—	23'0	—	12'0	—	36'5	—	34'3	—	22'1	—	7'2	—	—	—	33'3	—
'6	—	2'1	—	2'5	—	7'0	'91	4'8	'27	4'4	—	—	—	—	—	3'9	1'28
—	—	—	—	—	—	—	—	—	—	—	—	—	—	23'8	—	—	—
84'0	1'10	108'6	'69	120'2	'76	106'9	'30	141'7	'80	100'3	'40	82'7	1'79	23'8	—	69'9	—
—	—	'2	—	'5	—	—	'30	—	—	—	—	—	—	—	—	—	—
'6	—	'5	'23	'3	'51	'9	'30	'5	'27	'4	'40	—	'45	—	—	'6	'64
—	—	—	—	—	—	—	'30	'8	—	—	—	—	—	—	—	—	—
2'2	—	—	—	—	—	1'5	—	'8	—	'4	—	'4	—	—	—	1'3	—
—	—	'2	—	'5	—	'6	—	'8	—	'8	—	—	—	—	—	4'5	—
'6	—	'7	—	'5	—	—	—	—	—	'8	—	—	—	—	—	—	—
1080'4	12'14	1026'4	12'64	1168'6	9'16	1911'4	13'70	1465'6	12'32	1461'5	6'01	842'5	6'70	642'9	—	1593'6	15'38



Bengal.

## GENERAL DISEASES.

Stations	Pre- sidency.	Allahabad.		Oudh.		Bohildund.		Sangor.		Gwalior.		Meerut.		Sirhind.		Lahore.		Rajal Pindl.		Peshawar.		Camp of Exercise and Troops on March.		Field Service.		Convales- cent Depôts.
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	
Average Strength	2,028	8,178	3,773	2,622	1,148	1,810	4,354	3,929	3,284	3,731	2,404	2,236	84	1,560												
General Diseases.	<i>Febrile Group.</i>	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	
		5	10	32	1	137	4	92	3	129	4	443	12	820	10	551	7	410	2	914	3	86	—	3	—	1
		415	433	434	5	434	4	92	3	129	4	443	12	820	10	551	7	410	2	914	3	86	—	3	—	182
		516	599	646	2	646	2	360	1	328	1	628	—	313	1	2,984	2	1,445	11	1,116	—	402	—	16	—	768
		2	5	1	—	—	—	—	—	3	3	2	2	—	—	—	—	1	—	—	—	2	—	—	—	—
		—	5	—	—	—	—	—	—	—	—	4	—	15	—	1	—	1	—	—	—	2	—	—	—	1
		1	—	4	1	6	—	3	—	5	—	5	—	9	1	4	—	5	1	1	—	3	—	—	—	3
		—	2	1	—	—	—	—	—	2	—	3	—	—	—	—	—	—	2	—	—	—	—	—	—	1
		939	1,054	1,118	8	262	4	443	4	463	8	1,102	14	1,160	12	3,551	9	1,864	14	2,031	3	465	2	19	—	916
		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Constitutional Group.</i>	Rheumatism	80	141	167	—	108	—	59	—	79	1	212	—	192	—	127	1	309	—	67	—	68	—	8	—	88
		148	439	293	—	398	—	163	—	128	—	224	—	213	1	156	1	208	—	98	—	199	—	2	—	164
		16	19	29	3	14	1	7	1	13	—	29	3	31	2	40	6	29	1	5	—	16	1	—	—	51
		—	1	—	—	—	—	—	—	—	—	1	—	—	—	1	—	1	—	—	—	—	—	—	—	—
		—	3	4	—	9	—	5	—	3	—	13	—	5	—	6	1	9	—	2	—	6	—	—	—	17
		1	2	2	—	2	—	—	—	—	—	3	2	2	—	2	1	1	—	—	—	—	1	—	—	—
		245	605	495	3	531	1	234	1	223	1	482	5	443	3	332	10	537	1	172	—	283	2	10	—	320
		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Ratio per 1,000 of Mean Strength.

Stations	Presi- dency.	Alla- habad.		Oudh.		Rohil- cund.		Saugor.		Gwalior.		Meerut.		Sirhind.		Lahore.		Rawal Pindl.		Peshawar.		Camp of Exercise and Troops on March.		Field Service.		Con- valascent Depôts.	
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.		
General Diseases.																											
<i>Febrile Group.</i>																											
Eruptive Fevers	2.5	—	3.1	3.4	—	.4	—	2.6	—	.5	—	3.5	—	.8	—	3.3	—	—	—	—	—	—	—	—	—	.7	
Continued "	204.6	.46	136.3	1.53	115.0	1.05	54.3	1.53	80.1	2.61	71.2	2.21	101.8	2.76	208.7	2.55	167.8	2.13	109.9	.64	366.5	1.20	38.5	—	35.7	97.4	1.92
Paroxysmal "	254.4	—	188.4	.63	171.2	.53	46.8	—	305.0	.87	181.2	.55	144.2	—	79.6	.25	908.7	.61	386.9	2.94	447.5	—	179.8	.89	190.5	485.8	—
Cholera	1.0	.40	1.6	1.26	.3	.27	—	—	—	—	1.7	1.66	.5	.46	—	—	—	.3	—	—	—	.9	—	—	—	—	
Influenza	—	—	1.8	—	—	—	—	—	—	—	—	—	1.0	—	3.8	—	.3	—	.3	—	—	.9	—	—	—	.7	
Erysipelas	.5	—	—	—	1.1	.27	2.4	—	2.6	—	2.8	—	1.1	—	2.3	.25	1.2	—	1.3	.27	.4	—	1.3	—	—	1.9	
Other Diseases	—	—	.6	.3	—	—	—	—	—	1.1	—	1.1	—	—	—	—	—	.6	—	—	—	—	—	—	—	.7	
Total	463.0	.96	331.6	3.78	296.3	2.12	103.9	1.53	390.3	3.46	258.5	4.42	253.2	3.22	295.2	3.05	1061.3	2.74	489.3	3.75	614.4	1.20	221.4	.89	226.2	587.2	1.92
<i>Constitutional Group.</i>																											
Rheumatism	39.4	—	44.4	—	44.2	—	42.8	—	51.4	—	43.6	.55	43.7	—	48.9	—	38.7	.80	82.3	—	26.8	—	27.7	—	95.3	56.4	—
Syphilis	73.0	.40	138.2	—	77.6	—	157.8	—	141.9	—	70.7	—	51.4	—	54.2	.25	47.5	.80	55.8	—	39.3	—	89.0	—	23.8	105.2	.64
Scrofula, Phthisis, &c.	7.9	.99	6.0	1.89	7.7	.79	5.5	.40	6.1	.87	7.2	—	6.7	.69	7.9	.50	12.2	1.83	7.8	.27	2.0	—	7.2	.46	—	32.6	1.92
Scurvy and Purpura	—	—	.3	—	—	—	—	—	—	—	—	.2	—	—	—	—	.3	—	.3	—	—	—	—	—	—	—	—
Anæmia	—	—	.9	—	1.1	—	3.6	—	4.4	—	1.7	—	3.0	—	1.3	—	1.8	.30	2.4	.9	—	—	2.7	—	—	10.9	—
Other Diseases	.5	—	.6	.6	—	.8	—	—	—	—	—	.7	.46	—	.5	—	.6	.30	.3	—	—	.46	—	—	—	—	—
Total	120.8	1.46	190.4	1.89	131.2	.79	210.5	.40	203.8	.87	128.2	.55	110.7	1.15	112.8	.75	101.1	3.08	148.9	.27	69.0	—	126.6	.90	119.1	205.1	2.56

*Bengal.*

**General Diseases.**—Compared with the preceding year, the rate of admissions for diseases in this class is lower for every division excepting the Rohilcund, the rate of which shows a small increase; the reduction is a material one in most of the divisions, varying from 401·1 per 1,000 men in the Gwalior, to 48·9 per 1,000 in the Presidency. For diseases of the *febrile group* the rate of admissions is lower than that of the preceding year for every division; it amounts to 67 per 1,000 men for the Presidency, to 88 for the Allahabad, and also for the Rohilcund, to 154 for the Oudh, to 155 for the Meerut, to 171 for the Rawal Pindi, to 250 for the Lahore, to 262 for the Peshawar, to 273 for the Saugor, and the same also for the Sirhind, and to 423 for the Gwalior. For Convalescent Depôts on the other hand there is an increase of 89 per 1,000 men. For diseases of the *constitutional group* the rate of admissions is lower than in the preceding year for Allahabad, Oudh, Sirhind, Lahore, and Peshawar, for the remaining divisions it is higher; the greatest decrease is that for the Peshawar division, 74 per 1,000 men, the smallest decrease is 13 per 1,000 for the Allahabad. The largest increase is 101 per 1,000 for Rohilcund, the smallest is 1 per 1,000 for the Meerut. For convalescent depôts the rate is the same in both years. The rate of deaths for diseases of the *febrile group* is lower than in the preceding year for Allahabad by 1·81 per 1,000 men, for Lahore by 1·80, for Rohilcund by 2·06, for the Presidency by 2·79, and for Peshawar by 18·51; the very large reduction in the rate for the last-named division is accounted for by the non-appearance of cholera in it in 1878. The rate of deaths for Convalescent Depôts is lower by 9·31 per 1,000 men, in this instance also the reduction is due to freedom from epidemic cholera. The rate of deaths is higher than in 1876 for the Saugor division ·08 per 1,000 men, for the Meerut, ·34, for the Sirhind, ·50, and for the Gwalior, 2·71. The rate of deaths for diseases of the *constitutional group* is lower for every division excepting Saugor, Sirhind, and Lahore, in each of which it is fractionally higher. For Convalescent Depôts there is a decrease of 2·76 per 1,000 men.

**Eruptive Fevers.**—The rate of prevalence of fevers of this kind is not important in any division; in the Rawal Pindi, and in the Peshawar, no admission for an eruptive fever took place; in the other divisions the differences between the rates of the present and those of the preceding year are mostly fractional; for the Allahabad, the Oudh, and the Sirhind, however, there is in each instance a large decrease, a result due to the diminished prevalence of dengue fever in those divisions; this fever, which in the last quarter of 1876 had the features of a considerable epidemic in three of the divisions, suddenly subsided in the January of the present year, in which only one admission for it was returned, another admission took place in April, and the disease was not seen again until October, when it broke out in the Lahore division (one unaffected in the preceding year); in November and in December it reappeared in the Oudh, Sirhind, and Allahabad divisions, those in which it originated in the preceding year. Admissions for small-pox are returned for the Allahabad (5), the Rohilcund (1), the Gwalior (1), and the Meerut (10), divisions; more than half of the admissions were in the last month of the year.

**Continued Fevers.**—Compared with the preceding year, the rate of prevalence for fevers in this group is lower in every division excepting Saugor, Meerut, and Sirhind, it is also lower for depôts; in the instance of the first-named division the excess on the rate of 1876 is 45 per 1,000 men, in that of the second it is 23, and in that of the last named 20. In the divisions which show lower rates, the decrease is 64 per 1,000 men for Oudh, 50 for Rawal Pindi, 43 for Lahore, 22 for Rohilcund, 14 for Presidency, 11 for Peshawar, 6 for Gwalior, and 5 for Allahabad. The decrease for depôts is 26 per 1,000 men. With regard to the mortality due to fevers of the continued group, a higher death rate is in connexion with a higher admission rate in the three divisions noted above, the Saugor, the Meerut, and the Sirhind, being ·91, 1·20, and ·51 per 1,000 of the strength respectively higher than the rate for the preceding year, but on the other hand a higher death rate is found in connexion with a lower admission rate in the instances of Allahabad, and of Gwalior. Lower death rates are found together with lower admission rates in Oudh, in which the reduction is 3·61 per 1,000, Lahore, ·89, Presidency, ·93, Peshawar, ·90, Rawal Pindi, ·60, and Rohilcund, ·24. For Depôts there is an increase of 1·33 per 1,000 men.

*Enteric Fever.*—For all the divisions the rate of prevalence of this disease is 3·93 per 1,000 of the strength; the rate of deaths is 1·47 per 1,000. Compared with the corresponding rates of the preceding year, these results show a decrease of ·86 per 1,000 men in the rate of prevalence, and of ·28 per 1,000 in the rate of mortality. The proportion for deaths to cases of the disease treated is 373·2 per 1,000, being 8 per 1,000 higher than that for the preceding year.

With the exception of the troops in the Presidency, those in every division as well as those in Depôts and those marching, contributed to the admissions for enteric fever. The greatest prevalence was in Sirhind, where the disease appeared at every station in the division, and where it was especially prevalent amongst the troops at the Hill stations; at one of these, Subathu, in the third quarter of the year, the 73rd Foot suffered to a greater extent from it than any other corps in the Command during the year.

The stations at which the admissions and the deaths from enteric fever took place are shown in the following table, the data being taken from the Monthly Returns of the Command :—

Divisions.	Stations.	1st Quarter.		2nd Quarter.		3rd Quarter.		4th Quarter.		Total.	
		Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
Allahabad	Allahabad	—	—	1	—	—	—	1	—	2	—
	Dinapore	—	—	1	—	1	1	—	—	2	1
	Benares	—	—	—	—	1	1	—	—	1	1
Lucknow	Lucknow	2	2	1	—	—	—	4	1	7	3
	Fyzabad	1	—	—	—	1	1	—	—	2	1
	Bareilly	—	—	1	—	1	1	1	—	3	1
Rohilcund	Moradabad	—	—	1	—	—	—	—	—	1	—
	Shahjehanpore	1	1	1	1	—	—	—	—	2	2
	Ranikhet	—	—	1	1	1	—	—	—	2	1
Saugor	Jubbulpore	—	—	—	—	1	—	3	1	4	1
	Saugor	—	—	—	—	3	1	1	1	4	2
	Morar	—	1	2	2	—	—	—	—	2	3
Gwalior	Gwalior	1	—	—	—	—	—	—	—	1	—
	Fortress Gwalior	1	1	—	—	—	—	—	—	1	1
	Meerut	4	—	10	4	—	—	4	—	18	4
Meerut	Agra	—	1	7	4	2	1	—	—	9	6
	Delhi	—	1	—	—	—	—	—	—	—	1
	Roorkee	—	—	1	—	—	—	—	—	1	—
Sirhind	Chakrata	—	—	—	—	1	1	—	—	1	1
	Umballa	—	—	4	1	3	—	—	—	7	1
	Jullundur	—	—	1	—	—	—	—	—	1	—
Sirhind	Subathu	—	—	1	15	3	2	2	17	6	—
	Dagshai	—	—	2	—	6	2	—	—	8	2
	Solun	—	—	—	—	2	—	—	—	2	—
Lahore	Jutogh	—	—	—	—	1	1	—	—	1	1
	Meen Meer	2	—	4	2	1	—	2	2	9	4
	Fort Lahore	—	—	—	—	1	—	—	—	1	—
Rawal Pindi	Fort Govindgarh	1	1	—	—	—	—	—	—	1	1
	Ferozepore	—	—	—	—	1	1	—	—	1	1
	Rawal Pindi	—	—	—	—	1	1	4	1	5	2
Rawal Pindi	Sialkot	1	—	1	—	1	—	1	—	4	—
	Campbellpore	—	—	—	—	—	—	1	—	1	—
	Peshawar	—	—	4	2	1	—	2	—	7	2
Depôts	Cherat	—	—	—	—	1	1	—	—	1	1
	Landour	—	—	3	—	—	—	—	—	3	—
	Nynee Tal	—	—	1	—	—	—	—	—	1	—
Depôts	Kasauli	—	—	—	—	4	2	—	—	4	2
	Murree	—	—	—	—	—	—	1	1	1	1
	Troops marching.	1	—	—	—	—	—	3	—	4	—
Total in the Command		15	8	47	18	50	18	30	9	142	53

*Bengal.*

*Simple Continued Fever, and Febricula.*—The extent to which the rate of prevalence for each of the divisions differs from the corresponding one of the preceding year is substantially that given above for the whole group of continued fevers. Four deaths are returned as due to simple continued fever, being one at Allahabad, two at Cawnpore, and one at Ferozepore.

*Paroxysmal Fevers.*—The rate of admissions for fevers of this kind is higher than that for the preceding year in the Oudh division, by 55 per 1,000 men, but is lower for every other, and the decrease is generally very large; thus for the Lahore, that having the highest in the present year, the rate is one-fifth lower than in 1876; the rate for Rawal Pindi is one fourth lower; that for Peshawar is one-third lower; the rate for Saugor and also that for Gwalior is little more than the half; that for Meerut and also that for Rohilcund is less than the half, whilst the rate for Sirhind is less than a fourth of the corresponding rate for the preceding year. On the other hand the rate for Depôts is 126 per 1,000 men higher. The rate of mortality from paroxysmal fevers is higher than in 1876 for the Allahabad, Saugor, Gwalior, and Rawal Pindi divisions, fractionally only for each of them except the last named, the excess in the instance of which is 2·09 per 1,000 men, or nearly two-thirds greater. The deaths in the Rawal Pindi division were due to remittent fever; seven of them occurred at Sialkote, and four of them at Rawal Pindi. The deaths at the first-named station were those of men in the battery of Royal Artillery, and in the cavalry regiment exclusively. At Rawal Pindi all the deaths were those of the men of the battalion of infantry.

*Cholera.*—This disease was not present in an epidemic form amongst the troops in the Command during the year, although it was prevalent in the civil population of several districts, notably in those of Fyzabad, Dinapore, Morar, and Saugor. The 18 admissions took place at eight different stations, the greatest number at any one being six, at Benares.

The admissions and deaths from cholera at each station in the Command, in each week of the year, are shown in the following Table:—

Divisions.	Presi- dency.		Allahabad.				Oudh.		Saugor.		Gwalior.		Meerut.		Rawal Pindi.		Total.	
Stations.	Cal- cutta.		Benares.		Chunar.		Luck- now.		Jubbul- pore.		Morar.		Agra.		Rawal Pindi.			
—	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Week ending																		
January 26th	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
February 9th	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	1	1
May 4th	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	1	1
„ 11th	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—
„ 25th	—	—	2	1	—	—	—	—	—	—	—	—	—	—	—	—	2	1
June 1st	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	1	1
August 24th	—	—	2	1	—	—	—	—	—	—	—	—	—	—	—	—	2	1
Sept. 21st	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	1	1
October 5th	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	1	1
„ 12th	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—	1	1
„ 19th	—	—	—	—	—	—	—	—	—	—	2	2	—	—	—	—	2	2
„ 26th	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	1	1
Dec. 14th	—	—	—	—	—	—	—	—	2	1	—	—	—	—	—	—	2	1
„ 21st	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
„ 28th	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—
Total ad- mitted.	2	—	6	—	1	—	1	—	2	—	3	—	2	—	1	—	18	—
Total died	—	1	—	4	—	1	—	1	—	2	—	3	—	2	—	—	—	14

*Rheumatism.*—Compared with the preceding year, the rate of admissions is higher for the Presidency, Oudh, Rohilcund, Meerut, and Rawal Pindi divisions, whilst it is lower for the remaining ones, and also for Depôts. The decrease in the instance of Peshawar is 56 per 1,000 men. *Bengal.*

*Syphilis.*—Compared with the preceding year, the rate of admissions is higher for the Presidency by 19 per 1,000 men; for Allahabad by 2, for Rohilcund by 99, for Gwalior by 24, for Rawal Pindi by 2. The rate for Oudh is lower by 61 per 1,000 men, for Saugor by 72, for Meerut by 11, for Sirhind by 50, for Lahore by 7, for Peshawar 2. The rate for Depôts is higher by 27 per 1,000 men.

*Scrofula, Phthisis, &c.*—The rate of admissions for diseases of this kind is higher than in the preceding year for Gwalior by 2·6 per 1,000 men, for Meerut by 7, for Lahore by 8·3, and for depôts by 8·4. The rate is lower for Presidency by 9·9 per 1,000 men, for Allahabad by 2·2, for Oudh by 2·7, for Rohilcund by 4, for Saugor by 2·4, for Rawal Pindi by 1·6, for Peshawar by 11·4.

*Anæmia.*—Compared with the preceding year, the rate of admissions is lower for each of the divisions excepting Rohilcund, Saugor, and Sirhind; it is also lower for Depôts. The decrease for Lahore is 9·1, and that for Peshawar is 4 per 1,000 men.

*LOCAL DISEASES.—Diseases of the Nervous System.*—Compared with the preceding year, the rate of admissions is higher for the Presidency by 8·1 per 1,000 men, for Allahabad 2·5, for Saugor 3·1, for Meerut 1·1, for Sirhind 9·6, for Lahore 1·7, for Rawal Pindi 1·1. It is also 5·7 per 1,000 men higher for Depôts. The rate is lower for Oudh by 2 per 1,000 men, for Rohilcund by 2·9, for Gwalior by 5·3, for Peshawar by 23·4. The greater or less number of admissions for neuralgia determines the position in which each division appears in relation to the proportional prevalence of diseases of this order. The deaths in this order are principally from sunstroke. Compared with the preceding year the rate of deaths is higher for Rohilcund by 1·25 per 1,000 men, for Sirhind by 77, and for Lahore by 02. The rate is lower for Presidency by 93 per 1,000 men, for Allahabad by 1·07, for Oudh by 2·04, for Saugor by 1·70, for Gwalior by 02, for Meerut by 1·02, for Rawal Pindi by 1·51, for Peshawar by 2·59. One death (at Calcutta) was from hydrophobia.

*Diseases of the Eye.*—The rates of admissions do not differ materially from those for the preceding year, except in the instance of Gwalior, for which it is 11·7 per 1,000 men lower, and of Rawal Pindi, for which it is 9·2 lower.

*Diseases of the Circulatory System.*—The rate of admissions for diseases of this order is higher than in the preceding year, for the Presidency, Rohilcund, Saugor, Gwalior, Sirhind, Lahore, and Rawal Pindi divisions; the greatest increase is 14·2 per 1,000 men for Gwalior. The rates of admissions are lower for all the other divisions and also for depôts; the greatest reduction is 25·6 per 1,000 men for Peshawar. The greater or less prevalence of palpitation amongst the troops in a division accounts for a rise or fall in the rate of admissions for the whole group; from the same cause also it results that the rate of mortality has no constant relation to the proportion of admissions for diseases of the circulatory system.

*Diseases of the Respiratory System.*—Compared with the preceding year the rate of admissions is higher for Saugor by 27 per 1,000 men, for Sirhind by 2, for Lahore by 5, for Rawal Pindi by 10; it is lower for each of the other divisions and for Depôts. The rate of deaths is higher for the Presidency by 02 per 1,000 men, for Allahabad by 31, for Saugor by 3·48, for Gwalior by 1·10, for Rawal Pindi by 1·29; the rate is lower for Oudh by 26, for Rohilcund by 1·46, for Meerut by 44, for Sirhind by 1·02, for Lahore by 65, and for Peshawar by 42; it is also lower for depôts by 49 per 1,000 men.

*Diseases of the Digestive System.*—Compared with the preceding year the rate of admissions is higher for Saugor by 30 per 1,000 men, for Gwalior by 5, for Sirhind by 76; it is also higher for Depôts by 16. The rate of admissions is lower for Presidency by 73 per 1,000 men, for Allahabad by 59, for Oudh by 6, for Rohilcund by 68, for Meerut by 10, for Lahore by 29, for Rawal Pindi by 38, for Peshawar by 86. The rate of deaths is higher for Saugor by 92 per 1,000 men, for Gwalior by 1·06; the death rate is lower for each of the other divisions and also for depôts.

*Bengal.*

The prevalence of dysentery, diarrhoea, and hepatitis, in each of the divisions, and the deaths due to them, are shown in the first of the following tables; in the second, the relation of prevalence and mortality of these diseases to seasons is shown :—

Ratio per 1,000 of Strength.

Divisions.	Presi- dency.		Alla- habad.		Oudh.		Rohil- cund.		Saugor.		Gwalior.		Meerut.	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Dysentery - -	24·6	—	24·6	—	26·0	·53	14·7	·40	17·4	—	16·8	—	12·2	—
Diarrhoea - -	28·6	·49	60·4	·63	44·9	—	21·0	—	30·5	·87	30·9	—	38·5	—
Hepatitis and ab- cess of the liver.	33·4	·98	45·3	3·46	56·8	1·33	27·8	1·99	27·0	1·74	42·0	2·21	43·4	2·99
	86·6	1·47	130·3	4·09	127·7	1·86	63·5	2·39	74·9	2·61	89·5	2·21	94·1	2·99

(continued.)

Divisions.	Sirhind.		Lahore.		Rawal Pindi.		Peshawar.		Depôts.		Troops on the March, and Camps of Exercise.	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Dysentery - -	30·8	·25	17·7	·30	11·5	·27	18·0	·40	27·0	—	25·0	·45
Diarrhoea - -	101·1	—	39·0	—	23·5	—	40·3	—	45·5	—	35·3	—
Hepatitis and ab- cess of the liver.	47·3	·51	40·8	·91	39·0	1·34	43·5	1·60	109·0	6·41	16·1	—
	179·2	·76	97·5	1·21	74·0	1·61	101·8	2·00	181·5	6·41	76·4	·45

—	Hepatitis (including Abscess of the Liver).				Dysentery.				Diarrhoea.				Total.			
	Number.		Ratio per 1,000 of the Strength.		Number.		Ratio per 1,000 of the Strength.		Number.		Ratio per 1,000 of the Strength.		Number.		Ratio per 1,000 of the Strength.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Ist quarter	315	9	8·6	·25	146	3	3·2	·08	287	—	7·8	—	748	12	20·4	·33
IIInd "	404	13	11·2	·36	204	1	5·6	·03	541	1	14·9	·03	1,149	15	31·7	·41
IIIrd "	447	23	12·4	·64	187	1	5·2	·03	429	2	11·9	·06	1,068	26	29·3	·72
IVth "	326	21	9·2	·59	185	2	5·2	·06	354	2	10·0	·06	865	25	24·6	—

*Diseases of the Urinary System.*—The prevalence of diseases of this order, *Bengal*, which substantially represents the prevalence of gonorrhœa, was greater than in the preceding year in the proportion of 63 in Rohilcund, 2 in Sirhind, 18 in Lahore, 31 in Rawal Pindi, 23 in Peshawar, Meerut 20, and 8 in Depôts. The rate of Presidency is lower by 13 per 1,000 men, Oudh 36, Saugor 5, Gwalior 4. Two deaths in this order are returned as due to Addison's disease.

*Diseases of the Cutaneous System.*—The rate of admissions for diseases of this order is higher than that of the preceding year for Oudh, Saugor, Gwalior, Meerut, and Sirhind; for each of the other divisions it is lower.

*CONDITIONS.—General Debility.*—The rate of admissions is higher than that of the preceding year for every division, excepting Rohilcund, Saugor, Lahore, and Peshawar, the differences are not important.

*Poisons.*—Compared with the preceding year the rate of admissions is higher for Presidency by 3·1 per 1,000 men, for Oudh by 1·7, for Saugor by 9·6, for Gwalior by ·6, for Lahore by 1; the rates for Rohilcund, and for Sirhind, are the same in both years; for the other divisions the rates are lower.

#### *Officers.*

In a mean annual strength of 1,334 commissioned officers there were 870 cases of illness or injury and 28 deaths, being, respectively, in the rates of 652 and 20·99 per 1,000 of the strength, or 154 and 6·16 per 1,000 of the strength lower than the rates for last year.

The principal diseases causing sickness among the officers were continued and paroxysmal fevers, rheumatism, bronchial affections, dyspepsia, dysentery, diarrhœa, hepatitis, boils, ulcers, and injuries. The mortality was chiefly due to enteric fever (4 deaths), tubercular diseases, diseases of the nervous system, hepatitis, injuries, &c.

#### *Women.*

The average annual strength of the wives of non-commissioned officers and soldiers was 3,215. There were 3,411 admissions into hospital (including 809 cases of childbirth), and 56 deaths. The admission rate is 1,062 per 1,000 of the strength, or 115 per 1,000 of the strength higher than that for last year, and the mortality rate 17·44 or 3·39 lower.

The principal diseases causing sickness among the women were continued and paroxysmal fevers, tubercular diseases, anæmia, bronchial affections, dyspepsia, diarrhœa, dysentery, hepatitis, uterine diseases, and debility. The deaths were due chiefly to fevers, phthisis pulmonalis, diseases of the nervous system, dysentery, diarrhœa, and hepatitis. Two women died in giving birth to children.

#### *Children.*

The average strength of soldiers' children was 6,379. There were 3,434 admissions into hospital and 270 deaths, being in the rates, respectively, of 538 and 42·33 per 1,000 of the strength. The admission rate is below that of last year by 198, and that of the deaths by 9·78 per 1,000 of the strength.

Sickness among the children was due chiefly to measles, whooping cough, continued and paroxysmal fevers, tubercular diseases, anæmia, infantile convulsions, conjunctivitis, laryngeal (including croup) and bronchial affections, teething, dysentery, diarrhœa, debility, and injuries. The mortality was caused chiefly by convulsions (61 deaths), diarrhœa (54), teething (28), diseases of the respiratory system (27), febrile diseases (25), debility (21), &c., &c.



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## II.—MADRAS.

## STATISTICAL REPORT.

The average annual strength of the troops in this Command was 11,016 non-commissioned officers and men; there were 12,591 admissions into hospital; the deaths (including those of 16 invalids who died on the voyage home or after their arrival in England) were 204 in number; and the average daily sick was 593. The rates represented by these numbers are for the admissions 1143, for the deaths 18·52, and for the constantly sick 53·83 per 1,000 of the annual average strength. The admission rate is 44·9, that of the deaths 1·90, and that of the constantly sick 3·43 per 1,000 men higher than in 1876.

The admissions and deaths in the different classes and orders of diseases are shown in the following Table:—

Orders.	Diseases.	Strength 11,016.				Ratio per 1,000 of Mean Strength.			
		Admitted.	Deaths.			1877.		1869-76.	
			In Command.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	<b>I. General Diseases.</b>								
1	Febrile Group -	2,337	44	—	44	212·1	4·00	231·6	3·70
2	Constitutional Group -	1,755	15	12	27	159·3	2·45	156·2	1·99
	<b>II. Diseases of the—</b>								
1	Nervous System -	164	24	—	24	14·9	2·18	19·9	1·97
2	Eye -	233	—	—	—	21·1	—	19·2	—
3	Ear -	71	—	—	—	6·4	—	9·4	—
4	Nose -	4	—	—	—	·4	—	·4	—
5	Circulatory System -	175	16	—	16	15·9	1·45	18·7	1·91
6	Absorbent „ -	424	—	—	—	38·5	—	24·8	—
7	Ductless Glands -	1	—	—	—	·1	—	—	—
8	Respiratory System -	437	4	—	4	39·7	·36	43·2	·53
9	Digestive „ -	3,465	59	3	62	314·5	5·63	337·6	6·88
10	Urinary „ -	1,183	—	1	1	107·4	·09	81·5	·16
11	Generative „ -	182	—	—	—	16·5	—	15·2	—
12	Organs of Locomotion -	41	—	—	—	3·7	—	4·7	·03
13	Cellular Tissue -	168	—	—	—	15·3	—	17·1	·02
14	Cutaneous System -	611	—	—	—	55·5	—	81·5	—
	<b>III. Conditions.</b>								
	Debility -	314	1	—	1	28·5	·09	36·1	·06
	<b>IV. Poisons.</b>	63	2	—	2	5·7	·18	8·5	·48
	<b>V. Injuries.</b>								
2	Accidental -	941	14	—	14	85·4	1·27	101·8	1·18
3	Homicidal -	—	—	—	—	—	—	·1	·05
4	Self-inflicted -	3	7	—	7	·3	·64	·2	·50
5	Judicial -	—	—	—	—	—	—	—	·03
	<b>VI. Surgical Operations</b>	3	—	—	—	·3	—	·5	—
	Cause unknown -	—	2	—	2	—	·18	—	·01
	No appreciable Disease	16	—	—	—	1·5	—	1·1	—
	<b>Total -</b>	12,591	188	16	204	1143·0	18·52	1209·3	19·50
	<b>Average of 10 years, 1867-76 -</b>	—	—	—	—	1244·6	20·08	—	—

**GENERAL DISEASES.**—The admission rate for this class exceeded that of *Madras*. the preceding year by 33·5, and the death rate is also higher by ·88 per 1,000 of the strength. *Febrile Diseases* were a little more prevalent, but less fatal, and *constitutional diseases* were both more prevalent and more fatal.

The following Table shows the prevalence and mortality of the principal diseases included in this class :—

General Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength.			
			1877.		1869-76.	
			Admitted.	Died.	Admitted.	Died.
<i>Febrile Group—</i>						
Eruptive Fevers - - -	7	—	·6	—	1·3	·09
Continued „ - - -	1,505	23	136·6	2·09	121·0	1·54
Paroxysmal,, - - -	774	1	70·3	·09	102·7	·39
Cholera - - - -	35	19	3·2	1·73	2·9	1·57
Influenza - - - -	6	—	·5	—	1·5	—
Erysipelas - - - -	7	—	·6	—	1·7	·06
Other Diseases - - -	3	1	·3	·09	·5	·07
Total - - - -	2,337	44	212·1	4·00	231·6	3·72
<i>Constitutional Group.</i>						
Rheumatism - - - -	320	1	29·0	·09	39·3	·01
Syphilis - - - -	1,315	1	119·4	·09	98·8	·20
Scrofula, Phthisis, &c. - - -	96	22	8·7	2·00	12·3	1·58
Scurvy and Purpura - - -	1	1	·1	·09	·4	·01
Anæmia - - - -	13	—	1·2	—	4·5	—
Other Diseases - - - -	10	2	·9	·18	·9	·19
Total - - - -	1,755	27	159·3	2·45	156·2	1·99

*Eruptive Fevers.*—Five admissions for small-pox and one for measles give a ratio lower by one half than that for 1876.

*Continued Fevers* were less prevalent and less fatal than in the previous year.

*Enteric Fever.*—The returns show that there were 65 admissions and 22 deaths from this form of fever, giving admission and death rates higher than those of 1876 by 1·32 and ·12 per 1,000 of the strength, respectively. Secun-

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derabad furnished half the number of admissions, and nearly half the number of deaths, Bangalore and Wellington being next in order. With the exception of Madras, Trichinopoly, Ramandroog, Cannanore, Calicut, Tonghoo, and Port Blair, all stations had one or more cases.

*Paroxysmal Fevers.*—The admission rate is 14·7 higher than that for last year, while the death rate is identical. All but 21 of the cases were of ague. The death was from remittent fever. Of 753 cases of ague recorded in the Command, 416 occurred in the Hyderabad Circle. Of 121 cases recorded in the Presidency Circle, 75 were furnished by the 43rd Regiment at Bellary.

*Cholera.*—There were 35 admissions and 19 deaths from this disease, giving ratios, respectively, fractionally only, higher than those for last year. Secunderabad, Thayetmyo, and Bangalore furnished the bulk of the cases.

*Rheumatism* was less prevalent than in 1876, the admission rate being 3·1 per 1,000 lower. There was one death.

*Syphilis.*—With regard to this disease the Principal Medical Officer writes, "The admission rate for syphilis compares very unfavourably with that of 1876, being 119·37 per 1,000 of the strength against 89·20. The death rate remains unchanged. The great increase in the ratio of admissions is attributed chiefly to clandestine intercourse, many women it is stated having during the famine resorted to prostitution as a means of subsistence; also that many of these women imported the disease into the cantonments from their own villages."

*Scrofula and Phthisis.*—The admission rate is below that of the previous year, and the death rate slightly higher.

*Anæmia.*—The admission rate is less than one half of that for 1876.

**LOCAL DISEASES.**—*Diseases of the Nervous System.*—The admission rate is much lower, than that of last year, but the death rate is fractionally higher. There were 13 deaths from sunstroke against 18 in the previous year.

*Diseases of the Eye.*—The ratio of admissions for these affections is considerably in excess of that of the previous year. The increase appears to be due to the prevalence of *conjunctivitis* at Secunderabad and Fort George.

*Diseases of the Circulatory System.*—Though the death rate is ·10 per 1,000 of the strength higher than last year's, the admission rate shows that these diseases were less prevalent. *Palpitation* furnished 112 out of 175 admissions, or a ratio of 10·16 per 1,000 men. This affection occurred chiefly among the infantry, but not at any particular station.

*Diseases of the Respiratory System* shows a higher mortality rate by one fourth than in 1876, the admission being a little lower.

*Diseases of the Digestive System.*—The admission rate shows a slight decrease when compared with that of the previous year, while the death rate is higher. Of 59 deaths, 49 were attributed to dysentery and hepatitis.

*Diseases of the Urinary System.*—The admission rate is in excess of that of 1876 by 18·9 per 1,000 men. Of 1,183 admissions, 1,002 were due to gonorrhœa and 45 to stricture of the urethra.

*Diseases of the Cutaneous System.*—The admission rate is 10· per 1,000 of the strength lower than that of last year. The bulk of the admissions was due to ulcers.

**CONDITIONS.**—*Debility* gives a lower rate of admissions than in 1876.

**POISONS.**—The admission rate is fractionally lower and the death rate is just half that of last year. Of 63 admissions, 22 are returned as "alcoholic poisoning" and 41 as "delirium tremens." The two deaths were both due to "alcoholic poisoning."

**INJURIES.**—*Accidental.*—The admission rate is lower than that for 1876. Of the 14 deaths, 8 were due to asphyxia from drowning, 3 to concussion of the brain, 2 to fracture of the skull, and 1 to gunshot wound of the head.

*Self-inflicted.*—The admission rate is lower and the death rate higher than in the previous year.

**SURGICAL OPERATIONS.**—There were three admissions, of these two were capital operations: in one amputation was performed, successfully, at the shoulder in the case of a man, who, when drunk, had discharged his rifle into his left shoulder; in the other, amputation was performed at the junction of the middle and lower third of the thigh, also successfully, in a case of extensive disease of the right knee joint, at a time when further interference seemed hopeless.

Admissions and deaths at each of the principal stations in the Command are shown in the following Table, which is taken from the report of the Principal Medical Officer :—

Stations.	Average Strength.	Average Daily Sick.	Admitted.	Died in and out of Hospital.	Invalided.	Ratio per 1,000 of Strength.				Average of previous Period of 10 Years.	
						Average Daily Sick.	mitted.	Died (in and out).	Invalided.	Admitted.	Died.
PRESIDENCY :											
Fort St. George -	646	33	618	13	26	51'08	956'66	20'12	40'25	1379'40	20'21
Palaveram -	41	1	13	—	—	24'39	317'07	—	—	478'38	11'86
St. Thomas's Mt. -	321	18	474	7	12	56'07	1476'64	21'81	37'38	1290'97	22'39
Trichinopoly -	285	21	445	4	25	73'68	1561'40	14'04	87'72	1328'68	18'35
Bellary -	845	65	1,243	8	37	76'92	1471'01	9'47	43'79	1121'43	9'18
Total -	2,138	138	2,793	32	100	64'54	1306'36	14'96	46'77	—	—
MYSORE :											
Bangalore -	1,730	84	1,459	24	67	48'55	843'35	13'87	38'73	1192'54	12'22
Cannanore -	634	33	652	8	25	52'05	1028'39	12'62	39'43	1160'76	15'80
Calicut -	97	4	94	2	4	41'24	969'07	20'62	41'24	1022'57	16'88
Malliaporam -	94	3	84	1	4	31'04	893'62	10'64	42'55	949'37	15'00
Total -	2,555	124	2,289	35	100	48'53	895'89	13'70	39'13	—	—
HYDERABAD :											
Secunderabad	2,401	139	2,896	37	83	57'89	1206'16	15'41	34'57	1263'52	25'64
Kamptee -	830	37	1,001	5	40	44'58	1206'02	6'02	48'19	1712'69	17'05
Seetabuldee -	49	2	84	1	—	40'82	1714'29	20'41	—	1611'30	10'57
Total -	3,280	178	3,981	43	123	54'27	1213'72	13'11	37'50	—	—
BURMAH :											
Rangoon -	749	41	850	18	73	54'74	1134'85	24'03	97'46	1264'11	12'73
Thayetmyo -	572	23	640	12	19	40'21	1118'88	20'98	33'22	1223'90	20'85
Tonghoo -	417	19	450	7	50	45'56	1079'14	16'78	119'90	1004'13	16'19
Port Blair -	134	4	85	2	4	29'85	634'33	14'92	29'85	884'62	10'66
Total -	1,872	87	2,025	39	146	46'47	1081'73	20'83	77'99	—	—
TROOPS TREATED AT CONVALESCENT DEPOTS AND OTHER HOSPITALS :											
Poonamallee -	155	41	392	10	3	264'52	2529'03	64'52	19'35	2856'74	58'43
Wellington -	523	53	923	16	37	101'34	1764'82	30'59	70'75	1329'75	15'76
Ramandroog -	58	4	63	—	1	63'97	1086'21	—	17'24	1273'09	11'93
Elsewhere -	14	—	—	2	—	—	—	142'86	—	—	—
Total -	750	98	1,378	28	41	130'67	1837'33	37'33	54'66	—	—
ON THE MARCH -	187	8	173	11	—	42'78	925'13	58'82	—	567'52	29'38

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The following Table, taken from the Principal Medical Officer's report, shows the prevalence and mortality of the different classes of diseases in each of the Administrative Circles :—

Orders.	Divisions - - -	Presi- dency.	Mysore.	Hydera- bad.	Burmah.		Depôts.	On the March.	Ratio per 1,000 of Strength.						Depôts.	On the March.
					Admitted.	Died.			Admitted.	Died.	Admitted.	Died.	Admitted.	Died.		
	Average Strength - -	2,138	2,855	3,280	1,872	796	187									
Diseases.																
I. General Diseases.																
1	Fœrile Group - -	466	7	439	10	909	13	2	217.98	8.27	171.82	8.91	277.10	8.98	190.73	8.91
2	Constitutional Group - -	504	4	375	4	472	4	15	235.73	1.87	147.84	1.56	143.90	1.22	120.75	0.53
II. Local Diseases.																
Diseases of the—																
Nervous System - -																
1	Eye - - -	29	2	19	1	45	6	3	13.56	0.93	7.44	0.39	13.72	1.83	17.09	4.27
2	Ear - - -	72		31		89		6	33.68	13.13	12.13		27.13		10.15	
3	Nose - - -	17		13		22		1	7.95	5.09	6.71		6.71		14.95	
4	Throat - - -	40	3	30	5	44	3	2	23.92	1.40	11.74	1.96	13.41	0.91	7.45	1.07
5	Circulatory System - -	139		72		153		2	65.01		28.18		46.65		16.56	
6	Ductless Glands - -															
7	Respiratory System - -	99	1	54	1	103		4	46.33	0.47	20.35	0.39	31.40	50.21	50.21	0.53
8	Digestive - - -	663	12	594	9	1,025	9	68	239.40	5.61	239.40	3.62	312.50	2.74	417.74	8.01
9	Urinary - - -	384		234		267		15	179.61	91.89	91.89		117.99	66.77	66.77	82.88
10	Genitival - - -	40		49		69		2	19.18	19.18	9.74		11.99	19.30	19.30	5.35
11	Organs of Locomotion - -	12		49		69		2	8.61	9.74	9.74		3.66	12.40	12.40	5.35
12	Cellular Tissue - -	25		93		65		5	11.69	11.69	50.98		19.62	15.40	15.40	5.35
13	Outaneous System - -	140		130		194		5	65.46		50.98		59.15	58.09	58.09	47.55
III. Conditions, &c.																
Debility - - -																
		63		48		50	1	3	29.47		16.83		15.24	0.30	51.28	
IV. Poisons - - -																
		7		12	1	23		1	3.27		4.70	0.89	7.01		8.55	0.53
V. Injuries.																
2	Accidental - - -	176	2	155	3	338	3	16	82.32	0.93	60.67	1.17	108.05	0.91	102.03	2.14
4	Self-inflicted - -		1		1	2	4		0.47			0.39	0.61	1.23	0.53	0.53
VI. Surgical Operations																
No appreciable Disease - -																
		1		2		2			0.47		0.78		0.61		1.38	
	Cause unknown - -	6				4			2.81				1.92		6.79	
Total - - -																
		2,793	32	2,289	35	3,981	43	26	1,306.36	14.95	895.90	13.68	1213.68	13.09	1,081.73	26.36
								11							33	925.14
																58.63

GENERAL DISEASES.—Compared with 1876 the admission ratios under this head were greater in the Presidency and Mysore Circles, less in that of Hyderabad, and but little changed in the Burmah Circle. In the Presidency and Mysore Circles the increased admission rates occur both in the febrile and constitutional groups. In the Presidency Circle the increase in the febrile group was due to continued and paroxysmal fevers, and in the constitutional group to syphilis; in the Mysore Circle to continued fevers in the febrile, and to syphilis in the constitutional group. The decrease noted in the Hyderabad Circle occurred in admissions from continued fever. The death ratio shows an increase in the Mysore and Burmah Circles, a decrease in the Hyderabad, but remains almost unchanged in the Presidency Circle. The increase noted in the Mysore Circle is due to cholera and enteric fever, the decrease recorded in the Hyderabad Circle to enteric fever, which caused but 9 deaths against 14 in 1876.

The admissions and deaths from the principal diseases in this class are shown in the following Table, taken from the Principal Medical Officer's returns :—

Madras.

Divisions	Presi- dency.	Mysore.	Hyder- abad.	Burmah.	Depôts.	On the March.	Presidency.	Mysore.	Hyderabad.	Burmah.	Depôts.	On the March.	
Average Strength	2,198	2,555	3,980	1,872	736	187	Ratio per 1,000 of Strength.						
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	
<i>Febrile—</i>													
Eruptive Fevers	2	338	436	139	187	17	0.94	0.39	0.60	0.53	—	—	
Continued "	122	81	424	73	63	10	153.48	132.39	132.93	74.25	—	90.91	
Paroxysmal "	4	3	84	2	12	4	57.06	31.70	139.27	38.99	—	53.48	
Enteric "	6	13	7	6	4	2	1.87	0.94	10.36	1.07	—	—	
Cholera	4	5	7	3	10	3	2.81	1.96	2.74	5.34	—	16.30	
Influenza	2	1	1	1	3	1	1.40	0.39	2.13	0.91	—	5.43	
Erysipelas	1	1	1	1	1	1	0.94	0.39	0.30	—	—	2.72	
Other Diseases	—	—	3	1	—	—	—	—	0.91	0.53	—	16.04	
												10.70	
Total	468	7 439	10 909	13 926	6 269	6 30	217.97	171.82	277.10	120.71	3.21	160.43	
												10.70	
<i>Constitutional—</i>													
Rheumatism	70	60	81	63	45	2	32.74	23.45	24.70	33.65	—	10.70	
Syphilis	413	292	375	150	65	12	133.17	114.28	114.33	80.13	—	64.17	
Scrofula, Phthisis, &c.	14	3	13	4	1	1	6.55	7.83	3.96	0.53	—	5.35	
Scurvy and Purpura	—	—	—	1	1	—	—	—	—	—	—	—	
Anæmia	6	5	1	1	2	—	2.81	1.96	0.30	0.53	—	—	
Other Diseases	1	1	2	4	—	—	0.46	0.39	0.61	2.14	—	—	
												—	
Total	504	4 378	4 472	4 226	1 166	2 15	235.73	147.94	143.90	120.73	0.53	80.22	

*Continued Fevers.*—The ratios for admissions for this group are higher than in 1876 for the Presidency and Mysore Circles, and lower for Hyderabad, Burmah, and the Depôts. In the Presidency Circle the increase occurred principally at Bellary, Trichinopoly, and St. Thomas' Mount; in the Mysore Circle, at Bangalore. The decrease noted in the Hyderabad Circle occurred at Kamptee only, and in the Burmah Circle it was restricted to Thayetmyo and Tonghoo.

*Enteric Fever.*—The Principal Medical Officer reports an increase in the admission rate of 1·32 per 1,000 of the strength. The Hyderabad Circle contributed the largest ratio of admissions amounting to 10·36 per 1,000 men, Mysore comes next with a ratio of 5·09, the Presidency follows with one of 1·87, and the Burmah Circle furnishes a ratio of 1·07 only. The death rates for Hyderabad and Mysore Circles were identical, viz., 2·74 each, and that for the Presidency Circle is ·94. In Burmah there were no fatal cases.

The stations where cases of enteric fever occurred, and the months during which they were admitted into hospital, are shown in the following Table, taken from the returns furnished by the Principal Medical Officer:—

Stations.	Average Strength.	Admissions for Enteric Fever,												Total.		Deaths.	
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Number admitted.	Ratio per 1,000 of Strength.	Number died.	Ratio per 1,000 of Strength.
<b>PRESIDENCY :</b>																	
St. Thomas' Mount -	321	—	—	—	1	—	—	—	—	—	—	—	—	1	3·11	1	3·11
Bellary - - -	845	—	1	1	—	—	1	—	—	—	—	—	—	3	3·55	1	1·18
<b>MYSORE :</b>																	
Bangalore - - -	1,730	1	1	—	—	—	3	—	1	—	1	3	2	12	6·94	7	4·05
Malliaporam - -	94	—	—	—	—	—	1	—	—	—	—	—	—	1	10·64	—	—
<b>HYDERABAD.</b>																	
Secunderabad - -	2,401	1	1	3	2	8	6	2	5	—	3	2	—	33	13·74	9	3·74
Kamptee - - -	830	—	—	—	—	—	—	—	—	—	—	—	1	1	1·20	—	—
<b>BURMAH :</b>																	
Rangoon - - -	749	—	—	—	—	—	—	—	1	—	—	—	—	1	1·33	—	—
Thayetmyo - - -	572	—	1	—	—	—	—	—	—	—	—	—	—	1	1·75	—	—
<b>DEPÔTS :</b>																	
Poonamallee - -	155	—	—	—	—	—	—	—	—	—	—	—	1	1	6·45	1	6·45
Wellington - - -	523	—	1	—	—	1	—	—	6	2	1	—	—	11	21·03	3	5·73
Total in the Command -	—	2	5	4	3	9	11	2	13	2	5	5	4	65	—	22	—



*Madras.*

The ages and periods of residence in India of those attacked by enteric fever are shown in the following Tables, which are taken from the report of the Principal Medical Officer :—

Ages.	Number admitted for Enteric Fever.	Per-centage of Total Admissions.	Number of Deaths from Enteric Fever.	Per-centage of Total Deaths from Enteric Fever.
17 to 18	2	3·08	1	4·55
18 to 19	1	1·54	—	—
19 to 20	2	3·08	1	4·55
20 to 21	7	10·77	1	4·55
21 to 22	6	9·23	3	13·64
22 to 23	8	12·31	1	4·55
23 to 24	6	9·23	1	4·55
24 to 25	5	7·70	3	13·64
25 to 26	1	1·54	—	—
26 to 27	6	9·23	2	9·09
27 to 28	4	6·15	—	—
28 to 29	5	7·70	3	13·64
29 to 30	4	6·15	3	13·64
31 to 32	1	1·54	—	—
32 to 33	1	1·54	—	—
33 to 34	1	1·54	1	4·55
34 to 35	1	1·54	1	4·55
35 to 36	2	3·08	—	—
37 to 38	1	1·54	1	4·55
38 to 39	1	1·54	—	—

Service in India.	Number admitted for Enteric Fever.	Per-centage of Total Admissions.	Number of Deaths from Enteric Fever.	Per-centage of Total Deaths from Enteric Fever.
Under 1 year	21	32·31	5	22·72
1 to 2 years	22	33·85	8	36·36
2 to 3 "	4	6·15	2	9·09
3 to 4 "	1	1·54	—	—
4 to 5 "	5	7·70	2	9·09
5 to 6 "	8	12·31	3	13·64
6 to 7 "	1	1·54	—	—
8 to 9 "	2	3·08	2	9·09
12 to 13 "	1	1·54	—	—

*Paroxysmal fevers* were more prevalent than in 1876 in all the Circles ; at the Depôts, however, there is a reduction in the admission rate.

*Cholera*.—For the Presidency Circle and at the Depôts the admission and death rates are lower than those of the previous year ; in the Hyderabad Circle the admission rate is fractionally higher, and that of the deaths identical ; and in the Mysore and Burmah Circles, where there were no admissions last year, the rates are—for the admissions, 1·96 and 5·34, and for the deaths, 1·17 and 3·21 per 1,000 of the strength, respectively.

*Rheumatism* was less prevalent than in 1876. There was a decrease in the admission rates for all the circles except the Presidency.

*Syphilis*.—Compared with 1876 there is a marked increase in the admission rates for the Presidency and the Mysore Circles, a small increase in that for

the Hyderabad Circle, a moderate decrease for Burmah, and a large decrease *Madras*. for the Depôts.

*Scrofula and Phthisis*.—The admission rates are lower in all the Circles, except the Presidency, than in the preceding year, being reduced by nearly one half in the Hyderabad and Burmah Circles, while the rate is doubled in the Presidency.

*Anæmia*.—Out of 13 admissions, 6 occurred in the Presidency.

**LOCAL DISEASES.**—*Diseases of the Nervous System*.—Compared with 1876 the Presidency rate remains nearly unchanged, that of the Hyderabad and Mysore Circles is reduced one half, and Burmah also shows a considerable reduction. The decrease noted in Hyderabad is due to a decrease in cases of sunstroke and neuralgia, in Mysore to fewer admissions for neuralgic affections, and in Burmah to a decrease in the number of cases of mental diseases and neuralgic affections.

*Diseases of the Eye*.—The admission rates show an increase in the Presidency and Hyderabad Circles, and a decrease in the Mysore and Burmah Circles. The increase in the two former being due to conjunctivitis and catarrhal ophthalmia in the 67th Regiment at Madras, and to catarrhal ophthalmia in the 43rd Regiment at Bellary.

*Diseases of the Circulatory System*.—The ratios are increased in the Presidency, Mysore, and Hyderabad Circles. The Burmah Circle shows a decrease chiefly from a smaller number of admissions for palpitation, an affection which is the principal cause of a large increase in the rate for the Mysore Circle.

*Diseases of the Respiratory System*.—The admission rates are higher for all the Circles except Hyderabad. In the Burmah Circle, where the increase is most marked, it is due to a large number of admissions for bronchitis.

*Diseases of the Digestive System*.—Compared with the rates for 1876 the admission rate for the Presidency Circle is lower by 35·8, that for the Hyderabad Circle by 14·9, and that for the Depôts by 63·4 per 1,000 of the strength. While for the Mysore and Burmah Circles the rates are, respectively, 14·9 and 12·6 higher. The death rates for the Hyderabad and Mysore Circles are higher, and those for the Presidency Circle, Burmah, and the Depôts are lower.

The relative prevalence of certain important diseases of this order, in each Division of the Command, is shown in the following Table, taken from the report of the Principal Medical Officer:—

Circles.	Ratio per 1,000 of Strength.											
	Presidency.		Mysore.		Hyderabad.		Burmah.		Depôts.		On the March.	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Dysentery - - -	43·97	1·87	66·93	1·17	51·21	0·91	118·59	4·81	165·76	1·36	171·12	—
Diarrhoea - - -	60·33	0·46	39·53	—	91·16	—	69·44	0·53	107·34	—	106·95	10·70
Hepatitis, including abscess of liver -	48·64	2·81	55·18	1·96	42·37	1·83	62·50	2·14	169·83	9·51	10·70	5·35
Total - - -	152·94	5·14	161·64	3·13	184·74	2·74	250·53	7·48	442·93	10·87	288·77	16·05
Dyspepsia - - -	63·61	—	40·31	—	69·51	—	105·76	—	112·77	—	26·74	—

*Madras.*

The relation between the prevalence and mortality of the diseases specified is shown in the following Table, taken from the report of the Principal Medical Officer :—

Stations.	Ratio per 1,000 of Strength.			
	1877.		Average of previous Period of eight Years. 1869-76.	
	Admitted for Dysentry, Diarrhœa, Hepatitis, including Abscess of Liver.	Died from these Diseases.	Admitted for Dysentry, Diarrhœa, Hepatitis, including Abscess of Liver.	Died from these Diseases.
<b>PRESIDENCY:</b>				
Fort St. George and Palaveram -	131·00	8·73	128·2	4·06
St. Thomas' Mount - - -	236·76	6·23	220·7	9·06
Trichinopoly - - -	214·04	3·51	186·2	7·17
Bellary - - -	118·34	2·36	118·4	1·84
<b>MYSORE:</b>				
Bangalore - - -	120·81	1·73	146·2	3·61
Cannanore - - -	250·79	3·15	301·8	7·55
Calicut - - -	288·66	20·62	228·1	6·86
Malliaporam - - -	180·85	10·64	301·7	4·21
<b>HYDERABAD:</b>				
Secunderabad - - -	219·08	3·75	281·1	10·09
Kamptee and Seetabuldee -	91·01	—	129·6	2·50
<b>BURMAH:</b>				
Rangoon - - -	308·41	14·68	232·2	5·29
Thayetmyo - - -	181·82	3·50	179·9	1·69
Tonghoo - - -	290·17	2·40	313·1	5·65
Port Blair - - -	97·02	—	97·8	1·13

*Diseases of the Urinary System.*—The admission rate is higher than in the previous year for all the Circles except the Hyderabad, in which a slight decrease is noted.

*POISONS.*—Compared with 1876 the admission rate shows a reduction for the Presidency, a slight increase for the Burmah and Hyderabad Circles, and is almost unchanged for the Mysore Circle.

The extent of sickness, mortality, and invaliding in each Corps serving in *Madras*. The Command are shown in the following Table, which is taken from the report of the Principal Medical Officer:—

Corps.	Average Annual Strength.	Admitted into Hospital.	Deaths in the Command.	Invalided.	Ratio per 1,000 of Strength.		
					Admissions into Hospital.	Deaths.	Invalids.
Royal Engineers - - -	33	1	3	—	30'30	90'91	—
<b>CAVALRY.</b>							
12th Lancers - - -	431	485	11	8	1125'29	25'52	18'56
14th Hussars - - -	453	529	10	32	1155'02	21'83	69'87
Total - - -	889	1,014	21	40	1140'61	23'62	44'99
<b>ROYAL ARTILLERY.</b>							
B/B. late B/C. Royal Horse Artillery -	156	233	2	12	1463'59	12'82	76'92
C/C. " C/C. " -	171	183	3	6	1070'16	17'54	35'09
H/1 " A/9 Royal Artillery -	157	194	2	6	1235'57	12'74	38'22
K/1 " C/9 " -	149	234	8	7	1570'47	53'69	48'98
L/1 " D/9 " -	153	216	1	12	1411'76	6'54	78'43
O/1 " G/9 " -	153	203	2	4	1326'79	13'07	26'14
A/6 " A/20 " -	160	198	2	8	1237'50	12'50	50'00
B/6 " B/20 " -	153	203	3	5	1326'79	19'61	32'68
C/6 " C/20 " -	148	241	3	9	1628'38	20'27	60'81
D/6 " D/20 " -	156	215	4	8	1378'21	25'64	51'28
E/6 " E/20 " -	144	196	2	5	1361'11	13'89	34'72
F/6 " F/20 " -	158	188	1	7	1189'87	6'33	44'30
G/6 " G/20 " -	151	258	1	10	1708'61	6'62	66'23
8/8 " 1/5 " -	86	95	3	9	1104'65	34'88	104'65
9/8 " 2/5 " -	91	115	—	4	1263'74	—	43'96
10/8 " 3/5 " -	68	147	4	15	2161'76	58'82	220'59
11/8 " 4/5 " -	89	100	3	—	1123'59	33'71	—
12/8 " 5/5 " -	85	98	1	5	1152'94	11'76	58'82
13/8 " 6/5 " -	86	100	3	7	1162'79	34'88	81'40
14/8 " 7/5 " -	86	103	3	8	1197'67	34'88	93'02
2/9 " 7/6 " -	22	22	1	1	1000'00	45'45	45'45
Total - - -	2,622	3,542	52	148	1350'88	19'83	56'44
<b>INFANTRY.</b>							
2/16th Regiment - - -	917	1,062	12	20	1158'12	13'09	21'81
1/21st " - - -	807	778	20	49	964'06	24'78	60'72
33rd " - - -	758	907	7	33	1196'57	9'23	43'54
43rd " - - -	848	1,246	10	33	1469'34	11'79	38'92
44th " - - -	792	1,068	20	42	1348'48	25'25	53'03
45th " - - -	813	413	7	10	507'99	8'61	12'30
48th " - - -	837	860	12	35	1027'48	14'34	41'82
67th " - - -	873	946	10	50	1083'62	11'45	57'27
Head Quarters, 89th Regiment -	507	388	6	50 {	765'29	11'83	60'46
Left Wing, 89th Regiment -	320	366	8		1143'75	25'00	
Total - - -	7,472	8,034	112	322	1075'21	14'99	43'09

### Officers.

In an annual average strength of 454 commissioned officers, 324 were placed on the "sick list" during the year, and 6 died, being in the annual ratios of 714 and 13'22 per 1,000 of the strength. These rates are respectively 41 and 3'89 lower than in 1876.

Simple continued fever, febricula, ague, diarrhœa, and debility were the chief causes of disability. Two of the deaths were from phthisis pulmonalis, one from acute rheumatism, one from sunstroke, one from cholera, and one from Bright's Disease.

There were 33 officers invalided, giving a ratio of 72'68 per 1,000 of the strength, and being at a lower rate by 10'45 than for 1876.

*Madras.**Women.*

The average strength of the wives of non-commissioned officers and private soldiers was 1,365. There were 1,553 admissions into hospital (including 295 cases of parturition) and 37 deaths, being in the annual ratios of 1,139 and 27·13 per 1,000 of the strength. These rates are considerably in excess of the rates of the previous year.

Continued and paroxysmal fevers, anæmia, diseases of the eye (conjunctivitis), bronchitis, dyspepsia, dysentery, diarrhoea, hepatitis, and simple enlargement of the liver, hæmorrhagia, parturition, and debility were the principal causes of illness.

The deaths were due to enteric fever (1), simple continued fever (2), cholera (7), erysipelas (2), puerperal fever (1), phthisis pulmonalis (3), cancer (1), apoplexy (1), tetanus, following vaccination (1), pericarditis (1), pneumonia (1), emphysema (1), dysentery (2), diarrhoea (1), hepatitis (1), nephritis (1), hæmorrhage from uterus (1), abortion (2), parturition (1), metropéritonitis (1), debility (4), amputation of leg for caries of the tarsal bones (1).

*Children.*

The average strength of the children of the non-commissioned officers and private soldiers was 2,757, of these, 1,936 came under medical treatment, and 180 died. The admission rate was 702 and the death rate 65·28 per 1,000 of the strength, both rates being in excess of those for the preceding year.

The admissions were chiefly for eruptive, continued, and paroxysmal fevers, cholera, tubercular diseases, convulsions, conjunctivitis, bronchitis, teething, intestinal worms, dysentery, diarrhoea, boils, and debility. Deaths:—1 was from small-pox, 2 from enteric fever, 5 from simple continued fever, 5 from paroxysmal fevers, 12 from cholera, 1 from hereditary syphilis, 12 from tubercular affections, 5 from meningitis, 1 from paralysis, 29 from convulsions, 2 from croup, 2 from bronchitis, 3 from pneumonia, 1 from cancrum oris, 23 from teething, 9 from dysentery, 2 from intestinal worms, 30 from diarrhoea, 1 from jaundice, 1 from intussusceptio, 3 from premature birth, 1 from progressive muscular atrophy, 27 from debility, 1 from burns, and 1 from drowning.

## III.—BOMBAY.

Bombay.

## STATISTICAL REPORT.

The average strength of the troops in this Command was 10,139. The admissions into hospital were 13,688 in number, the deaths from all causes, in and out of hospital, and including those of invalids on their passage home, or after their arrival, amounted to 131, and the average daily sick was 573. The admission rate is therefore 1,350 per 1,000 of the strength, or 67·2 higher, the death rate 12·92 or ·98 lower, and that of the constantly sick 56·47, or 7·35 higher than for the preceding year.

The admissions and deaths in each class and order of diseases are shown in the following Table:—

Orders.	Diseases.	Strength, 10,139.				Ratio per 1,000 of Mean Strength.			
		Admitted.	Deaths.			1877.		1869-76.	
			In India.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	I. General Diseases.								
1	Febrile Group -	5,021	30	1	31	495·2	3·05	620·2	4·75
2	Constitutional „ -	1,311	11	4	15	129·3	1·48	143·0	2·11
	II. Local Diseases.								
	Diseases of the—								
1	Nervous System -	157	21	—	21	15·4	2·07	16·7	2·23
2	Eye -	182	—	—	—	18·0	—	25·8	—
3	Ear -	91	—	—	—	9·0	—	6·4	·01
4	Nose -	1	—	—	—	·1	—	·6	—
5	Circulatory System -	137	6	2	8	13·5	·79	14·0	1·14
6	Absorbent „ -	207	—	—	—	20·4	—	22·7	—
8	Respiratory „ -	423	6	—	6	41·7	·59	41·9	·75
9	Digestive „ -	2,278	20	2	22	224·7	2·17	220·1	3·87
10	Urinary „ -	1,223	1	—	1	120·6	·10	85·1	·21
11	Generative „ -	150	—	—	—	14·8	—	10·4	·01
12	Organs of Locomotion -	39	—	—	—	3·9	—	4·6	·05
13	Cellular Tissue -	184	—	—	—	18·2	—	17·2	·01
14	Cutaneous System -	703	—	—	—	69·3	—	70·5	·01
	III. Conditions, &c.								
	Debility -	373	—	—	—	36·8	—	21·6	·04
	IV. Poisons -	114	2	—	2	11·2	·20	8·5	·29
	V. Injuries.								
2	Accidental -	1,079	13	1	14	106·4	1·38	89·9	·81
3	Homicidal -	—	—	—	—	—	—	—	·07
4	Self-inflicted -	3	9	—	9	·3	·89	·2	·48
5	Judicial -	—	1	—	1	—	·10	—	·06
	VI. Surgical Operations	12	1	—	1	1·2	·10	·1	·01
	No appreciable Disease -	—	—	—	—	—	—	·8	—
	Total -	13,688	121	10	131	1350·0	12·92	1420·3	16·91
	Average of 10 years, 1867-76.	—	—	—	—	1375·9	17·24	—	—

Bombay.

**GENERAL DISEASES.**—When compared with the table in which the same information is given for last year, no material difference is observed in the admission or death rates for either group of diseases forming this class.

The admissions and deaths caused by the principal diseases of this class are shown in the following Table:—

Strength - - - - 10,139				Ratio per 1,000 of Mean Strength.			
				1877.		1869-76.	
General Diseases.	Admitted.	Died.		Admitted.	Died.	Admitted.	Died.
<i>Febrile Group—</i>							
Eruptive Fevers - - -	22	1		2·2	·10	1·4	·05
Continued „ - - -	982	15		96·8	1·47	141·5	1·79
Paroxysmal „ - - -	3,983	4		392·8	·39	472·0	1·05
Cholera - - - -	15	10		1·5	1·00	2·7	1·75
Influenza - - - -	6	—		·6	—	·8	—
Erysipelas - - -	9	—		·9	—	1·4	·06
Other Diseases - - -	4	1		·4	·10	·4	·05
Total - - - -	5,021	31		495·2	3·06	620·2	4·75
<i>Constitutional Group—</i>							
Rheumatism - - - -	369	1		36·4	·10	40·8	·05
Syphilis - - - -	854	1		84·2	·10	85·0	·12
Scrofula, Phthisis, &c. -	57	11		5·6	1·08	9·2	1·68
Scurvy and Purpura - -	3	—		·3	—	·6	·06
Anæmia - - - -	25	—		2·5	—	6·5	·05
Other Diseases - - -	3	2		·3	·20	1·1	·15
Total - - - -	1,311	15		129·3	1·48	143·0	2·11

*Eruptive Fevers* show a higher ratio of admissions than in 1876. Of 22 cases, 18 were of small-pox. The only death was from that disease; it occurred in an Indian invalid, at Malta, where, on his voyage home, he was landed from the P. and O. S. S. "Malwa," in May.

*Continued Fevers.*—There is an increase of 7·6 per 1,000 of the strength on the admission rate of last year, and a fractional decrease on the death rate. *Enteric Fever* furnished 35 of the admissions and all the deaths; the admission rate for this disease is at 3·45 and the death rate at 1·47 per 1,000 of the strength, the former being lower by 1·5 and the latter by ·17 than in the previous year. There were no deaths from *Simple continued Fever*.

*Paroxysmal Fevers.*—The ratio of admissions for these fevers is 14·1 per 1,000 of the strength lower, and that of the deaths ·10 higher than in 1876.

*Cholera.*—During the year, 15 cases occurred. A larger majority of the attacks were in the rainy season. Of this disease 10 cases proved fatal.

*Rheumatism* was more prevalent than in 1876; *Syphilis* less so; *Scrofula* and *Phthisis* furnished a lower proportion of admissions and deaths, and the admission rate for *Anæmia* was exactly the same.

**LOCAL DISEASES.**—Higher admission rates than in 1876 are observed for diseases of the *nervous, respiratory, digestive, urinary* (a considerable increase for this group), *generative*, and *cutaneous* systems, diseases of the *ear* and *cellular tissue*; and lower rates for the other groups in this class. The rate of mortality for diseases of the *digestive* system is just one-half lower and that for diseases of the *nervous* system 1·11 per 1,000 of the strength higher than in the previous year.

**CONDITIONS.**—The rate of admissions is 5·4 per 1,000 of the strength higher than in 1876.

**POISONS.**—The admission rate is higher and the death rate lower than in the previous year. There were 44 admissions for alcoholic poisoning, 50 for

delirium tremens, 1 for a scorpion's sting, 1 for a snake's bite, and 18 for vegetable poisoning, 17 of the latter occurred in the 2nd Battalion 11th Regiment, and are reported to be "due to the careless use of the Bellawa marking nut."

INJURIES.—*Accidents* show a higher rate of admissions by 10 per 1,000 of the strength, but the death rate is lower than in 1876. The proportion of admissions for *self-inflicted injuries* is exactly the same, but the death rate is 31 per 1,000 higher than in that year. One of the deaths was caused by poisoning with sulphuric acid, 3 by drowning, and 5 by gunshot.

SURGICAL OPERATION.—The death was from pneumonia following amputation of the forearm, which was performed in consequence of gangrene occurring after a gunshot wound.

The admissions and deaths in the principal stations in the Command are shown in the following table compiled from the monthly returns:—

Military Divisions.	Stations.	Annual Average Strength.	Hos-Admitted into pital.	Died in India.	Ratio per 1,000 of the Strength.			
					Admitted.	Died.	Average of 10 Years, 1867-76.	
							Admitted.	Died.
Presidency	Bombay	470	1,189	5	2529·8	10·64	1590·2	15·64
	*Deolali	59	80	1	1356·0	16·95	2655·8	31·48
	†Baroda	217	465	6	2142·9	27·65	2779·0	25·51
	Ahmedabad	199	289	6	1452·3	30·15	2058·6	24·69
	Mount Abou	74	64	1	864·9	13·51	1820·6	18·26
	Deesa	673	703	7	1044·6	10·40	1276·1	17·22
	Aden	709	594	7	837·8	9·87	1030·6	14·33
	Kurrachi	800	867	9	1083·8	11·25	1555·6	14·14
	Hyderabad	405	648	2	1600·0	4·94	1463·4	15·33
Poona	Poona	1,360	1,958	21	1439·7	15·44	1361·6	12·47
	Kirkee	537	728	5	1335·2	9·31	1268·0	10·20
	Ahmednagar	509	667	6	1310·4	11·79	1164·0	8·51
	Satara	157	252	1	1605·1	6·36	1076·5	12·23
	Belgaum	1,010	1,082	10	1071·3	9·90	960·0	7·99
Mhow	Mhow	1,309	1,895	10	1447·1	7·10	1558·6	12·47
	Indore	102	190	1	1862·7	9·80	1454·3	12·90
	Neemuch	445	675	—	1516·9	—	1956·1	29·30
	Nasirabad	611	769	11	1258·6	18·00	1815·8	34·70
	Assirgarh	33	39	2	1181·8	60·61	1105·3	11·03
	Depôts, Sanitaria, &c.	233	463	5	1987·1	21·46	2311·3	57·74
	Troops marching	143	70	1	489·5	7·00	887·6	11·80

The rate of admissions is higher than in the preceding year for Bombay by 468 per 1,000 men, for Deolali by 259, for Baroda by 659, for Deesa by 76, for Aden by 58, for Poona by 55, for Kirkee by 42, for Satara by 845, for Belgaum by 227, and for Mhow by 79. For each of the remaining stations the admission rate is lower, the most important reductions being for Ahmedabad 174, for Kurrachi 58, for Hyderabad 600, for Ahmednagar 155, for Neemuch 294, and for Nasirabad 233 per 1,000 men. The main cause, alike of increased, and of the reduced rates of admission, at the several stations, was the comparative prevalence of ague at them in the two years. The prevalence of diarrhoea at Poona, and at Kirkee, in the third quarter of the year, contributed to a small extent to the raising of the admission rates for those stations.

The admissions and deaths in the various classes and orders of diseases are shown in the following table compiled from the monthly returns:—

\* For four years only.

† For three years only.



Bombay.

Order.	Military Divisions	Presi- dency.	Poona.		Mhow.		Troops on March.		Convales- cents and Invalids.		Poona.		Mhow.		Troops on March.		Convales- cents and Invalids.	
			3,583		2,502		143		240		Ratio per 1,000.							
			Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Average Annual Strength	3,583																
	Diseases.																	
	I. General Diseases.																	
1	Febrile Group	2,163	11	1,569	17	3	14	1	145	1	3.06	4.74	451.2	1.20	98.0	—	604.2	4.17
2	Constitutional "	404	4	555	2	3	10	—	72	2	1.11	.55	113.7	1.20	69.9	—	300.0	8.33
	II. Local Diseases.																	
	Diseases of the—																	
1	Nervous System	76	13	47	3	3	2	1	5	1	3.92	.84	16.8	1.20	14.0	6.99	20.8	4.17
2	Eye	45	—	64	—	—	—	—	4	—	—	—	—	—	7.0	—	16.6	—
3	Ear	34	—	18	—	—	—	—	1	—	—	—	—	—	—	—	4.2	—
4	Nose	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5	Throat	48	2	25	1	1	—	—	9	—	.56	.28	22.8	.40	—	—	37.5	—
6	Circulatory System	76	—	77	—	—	—	—	10	—	—	—	—	—	—	—	41.7	—
7	Absorbent	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8	Ductless Glands	113	1	122	1	3	4	—	1	—	—	—	—	—	—	—	4.2	—
9	Respiratory System	702	6	833	10	3	13	—	13	—	.28	2.80	67.4	1.20	23.0	—	50.0	—
10	Urinary	291	—	533	—	1	6	—	93	—	1.66	2.80	232.3	1.20	90.9	—	387.5	—
11	Generative	30	—	76	—	—	—	—	80	—	—	—	—	—	41.9	—	125.0	—
12	Organs of Locomotion	16	—	10	—	—	—	—	7	—	21.2	—	16.4	—	7.0	—	29.2	—
13	Cellular Tissue	42	—	75	—	—	—	—	1	—	—	—	—	—	—	—	—	—
14	Cutaneous System	313	—	175	—	—	—	—	13	—	—	—	—	—	—	—	20.8	—
	III. Debility	122	—	76	—	—	—	—	39	—	—	—	—	—	—	—	54.2	—
	IV. Poisons	41	1	44	—	2	1	—	—	—	.28	—	10.0	.80	—	—	162.5	—
	V. Injuries.																	
2	Accidental	368	4	385	5	2	13	—	14	—	1.11	1.39	118.7	.80	90.9	—	58.3	—
4	Self-inflicted	—	3	—	3	—	—	—	—	—	.84	.84	—	.40	—	—	—	—
5	Judicial	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
	VI. Surgical Operations																	
	No appreciable Disease	—	—	—	—	—	—	—	—	—	—	.28	—	—	—	—	—	—
	Not known	—	—	—	—	—	—	—	—	—	—	.6	—	—	—	—	—	—
	General Total	4,899	45	4,694	43	24	70	1	464	4	13.63	12.00	1426.4	9.60	469.5	6.99	1583.8	16.67

**GENERAL DISEASES.**—Compared with the preceding year, there is an increase in the rate of admissions for the Presidency Division of  $\cdot 33$  per 1,000 men; for each of the others, and for troops marching, there is a decrease amounting for Poona to 47, for Mhow 137, and for troops marching to 84 per 1,000 men. These reductions, however, are accompanied by an increase in the rate for Depôts of 297 per 1,000 men. The death rate is higher for the Presidency by  $1\cdot 42$  per 1,000 men, and for Poona by  $2\cdot 89$ ; it is lower for Mhow by  $2\cdot 76$  per 1,000 men, and for Depôts by  $2\cdot 81$ .

The admissions and deaths from the principal diseases in the class are shown in the following table compiled from the monthly returns:—

Military Divisions -	Presidency.		Poona.		Mhow.		Troops on March.		Convalescent Depôts and Invalids.	
Strength -	3,595		3,582		2,502		143		240	
General Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
<i>Febrile Group.</i>										
Eruptive Fevers	12	—	10	—	—	—	—	—	—	—
Continued "	455	8	244	5	280	2	4	—	7	—
Paroxysmal "	1,691	1	1,292	3	845	1	10	—	135	1
Cholera	2	2	13	8	—	—	—	—	—	—
Influenza	1	—	4	—	3	—	—	—	—	—
Erysipelas	1	—	4	—	1	—	—	—	3	—
Other Diseases	—	—	2	1	—	—	—	—	—	—
Total -	2,162	11	1,569	17	1,129	3	14	—	145	1
<i>Constitutional Group.</i>										
Rheumatism	121	—	121	—	118	1	1	—	17	—
Syphilis	261	—	409	—	134	1	9	—	43	—
Scrofula, Phthisis, &c.	16	3	17	1	13	1	—	—	7	2
Scurvy and Purpura	2	—	6	—	3	—	—	—	2	—
Anæmia	2	—	1	—	13	—	—	—	3	—
Other Diseases	2	1	1	1	1	—	—	—	1	—
Total -	404	4	555	2	282	3	10	—	72	2

(continued).

Military Divisions -	Presidency.		Poona.		Mhow.		Troops on March.		Convalescent Depôts and Invalids.	
Strength -	Ratio per 1,000.									
General Diseases -	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
<i>Febrile Group.</i>										
Eruptive Fevers	3·3	—	2·8	—	—	—	—	—	—	—
Continued "	126·6	2·22	68·1	1·39	112·0	·80	28·0	—	29·2	—
Paroxysmal "	470·3	·28	380·7	·84	337·7	·40	70·0	—	562·5	4·17
Cholera	·6	·56	3·6	2·23	—	—	—	—	—	—
Influenza	·3	—	1·1	—	1·1	—	—	—	—	—
Erysipelas	·3	—	1·1	—	·4	—	—	—	12·5	—
Other Diseases	—	—	·6	·28	—	—	—	—	—	—
Total -	601·4	3·06	438·0	4·74	451·2	1·20	98·0	—	604·2	4·17
<i>Constitutional Group.</i>										
Rheumatism	33·6	—	33·8	—	47·2	·40	7·0	—	70·8	—
Syphilis	72·6	—	114·1	—	53·6	·40	62·9	—	175·0	—
Scrofula, Phthisis, &c.	4·4	·83	4·7	·28	5·2	·40	—	—	29·2	8·33
Scurvy and Purpura	·6	—	1·7	—	1·1	—	—	—	8·3	—
Anæmia	·6	—	·3	—	5·2	—	—	—	12·5	—
Other Diseases	·6	·28	·3	·28	·4	—	—	—	4·2	—
Total -	112·4	1·11	154·9	·56	112·7	1·20	69·9	—	300·0	8·33

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**Eruptive Fevers.**—The prevalence of fever of this nature (small-pox, in all but four instances) was confined to the Presidency and to the Poona Divisions, the rate of admissions for the first-named is 1·9 per 1,000 men higher than in 1876, and for the last is fractionally higher. The admissions, other than those for small-pox, were for measles (1), for scarlet fever (2), for dengue (1).

**Continued Fevers.**—Compared with the preceding year, the rate of admissions is higher for the Presidency Division by 20, for Poona by 34, and for troops marching by 20 per 1,000 men; the rate is lower for Mhow by 42, and for Depôts by 12. The rate of mortality for fevers of this nature is higher for the Presidency by 1·39, and for Poona by ·19 per 1,000 men; on the other hand the rate is lower for Mhow by 3·07 per 1,000 men.

**Enteric Fever.**—The relation of *enteric fever*, to locality, and to season in the present year, is shown in the following table compiled from the monthly returns of the Command :—

Divisions.	Stations.	1st Quarter.		2nd Quarter.		3rd Quarter.		4th Quarter.		Total.		
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	
Presidency	Baroda	-	—	—	—	1	2	1	—	—	2	2
	Deesa	-	1	1	—	—	—	—	—	—	1	1
	Ahmedabad	-	—	—	1	1	—	—	—	—	1	1
	Kurrachi	-	—	1	6	3	—	—	—	—	6	4
Poona	Kirkee	-	—	—	—	2	2	—	—	—	2	2
	Ahmednagar	-	1	—	—	—	—	1	—	—	2	—
	Belgaum	-	—	—	—	2	2	1	1	3	3	
Mhow	Mhow	-	2	1	1	—	—	—	1	—	4	1
	Assirgarh	-	—	1	—	—	—	—	—	—	—	1
Depôts, &c.-	Parandher	-	—	—	—	1	—	—	—	—	1	—
	Total	-	4	4	8	5	7	5	3	1	22	15

The only instance in which several cases of this fever occurred at the same time and in the same locality, and on this account, may be considered to have presented the features of an outbreak, was that at the station of Kurrachi, where in April, three men of the B. battery, 9th Brigade of Royal Artillery were attacked; at longer intervals three men of the 83rd Foot were also successively attacked there.

**Paroxysmal Fevers.**—The rate of prevalence for fevers of this kind is lower for every Division than in the preceding year, for the Presidency by 10 per 1,000 men, for Poona by 82, for Mhow by 56, it is lower for troops marching by 43. For Depôts, however, there is an increase of 343 per 1,000 men.

The proportional prevalence of paroxysmal fevers at the several stations in the Command, in the present and in the preceding year, are shown in the following table, the data have been taken from the monthly returns of the Command :—

Stations.	Rate of Admissions per 1,000 of the Strength.		Stations.	Rate of Admissions per 1,000 of the Strength.	
	1877.	1876.		1877.	1876.
Bombay -	1610·7	1085·8	Kirkee -	316·6	278·6
Hyderabad -	595·1	1356·5	Belgaum -	315·9	216·6
Ahmedabad -	582·9	709·9	Mount Aboo -	310·8	750·0
Baroda -	506·9	303·8	Deesa -	306·1	171·0
Neemuch -	469·7	590·6	Nasirabad -	245·5	358·1
Satara -	439·5	163·4	Kurrachi -	183·8	172·8
Poona -	399·2	614·1	Deolali -	135·1	356·6
Mhow -	365·2	361·7	Aden -	119·9	135·0
Ahmednagar -	349·7	455·8	Indore -	78·4	279·1

*Cholera.*—No considerable outbreak of this disease occurred during the year, but in the third quarter eight admissions took place at Poona, and in Kirkee, the contiguous station; the other admissions were two at Ahmednagar, and single ones at the following stations, Satara, Belgaum, Aden, and Baroda.

*Rheumatism.*—The rate of admissions is higher for Poona by 7·6 per 1,000 men, and for Mhow by 5·5 than in the preceding year; that for the Presidency is the same in both years; the rate for troops marching is lower by 25·2, and that for Depôts by 15·9.

*Syphilis.*—Compared with the preceding year the rate of admissions is higher for the Presidency by 23·7 per 1,000 men, but is lower for Poona by 6·5, and for Mhow by 43·6, for troops marching by 30·9, and for Depôts by 29.

*Scrofula and Phthisis.*—Compared with the preceding year the rate of admissions is lower for the Presidency by 1·4 per 1,000 men, for Poona by 1·3, for Mhow by 2·5, and for Depôts by 16·7. The rate of mortality shows a corresponding decrease for each of the Divisions, &c., excepting the Presidency, for which it is the same in both years.

**LOCAL DISEASES. Diseases of the Nervous System.**—Compared with the preceding year the rate of admissions for diseases in this order is higher for the Presidency by 5·1 per 1,000 men, for Poona by 2, and for Depôts fractionally; it is lower for Mhow by 4·7 per 1,000 men. The rate of mortality is higher for each of the Divisions, and also for troops marching, and for Depôts, the excess for the Presidency being 1·97 per 1,000 men, a two-fold increase, for Poona 54, for Mhow 77, for troops marching 6·99, and for Depôts 4·17. The greater number of attacks of apoplexy, and of sunstroke, account for the higher rate of mortality in each of the Divisions, from diseases of the nervous system in the present year, one death (at Deesa) was due to hydrophobia.

*Diseases of the Eye.*—Compared with the preceding year every one of the Divisions shows a lower rate of admissions for diseases in this order, that for the Presidency is lower by 12· per 1,000 men, that for Poona by 1, and that for Mhow by 7·4 per 1,000 men.

*Diseases of the Circulatory System.*—The rate of admissions is higher than in the preceding year for Mhow by 3·5 per 1,000 men, and for Depôts by 1·8, but it is lower for the Presidency by 5·8, and for Poona by 5·3. The rate of mortality is fractionally lower for each of the Divisions, for the Depôts by 5·10, and for troops marching it is the same in both years.

*Diseases of the Respiratory System.*—The rate of admissions is higher than in the preceding year for Mhow by 24·8 per 1,000 men, but it is lower for each of the other Divisions, and for Depôts, the decrease not being important in any instance. Corresponding with the increased rate of prevalence, the rate of mortality is 1·20 per 1,000 men higher for Mhow, whilst for the Presidency, and also for Poona, there is a fractional reduction.

*Diseases of the Digestive System.*—Compared with the preceding year the rate of admissions is higher for the Presidency by 10·5 per 1,000 men, and for Poona by 21·4, but is lower for Mhow by 40·7, for Depôts the rate is only fractionally different in the two years. The rate of mortality is materially lower for each of the Divisions, for troops marching, and for Depôts, that for the Presidency by 1·36 per 1,000 men, for Poona 1·72, for Mhow 1·81, for troops marching 2·68, and for Depôts 20·41.

The prevalence of dysentery, diarrhoea, and of hepatitis, in the several Divisions and the deaths due to those diseases, which occurred in the Command,

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are shown in the first of the two following tables; in the second table, the relation between the prevalence of, and the mortality from, the diseases mentioned, and season are shown:—

	Dysentery.				Diarrhoea.				Hepatitis, including Abscess of the Liver.				Total.			
	Number.		Ratio per 1,000 of the Strength.		Number.		Ratio per 1,000 of the Strength.		Number.		Ratio per 1,000 of the Strength.		Number.		Ratio per 1,000 of the Strength.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Ist Quarter	54	—	5·4	—	73	—	7·3	—	80	5	8·0	·50	207	5	20·7	·50
IInd "	64	—	6·3	—	130	1	12·9	·10	83	—	8·2	—	277	1	27·4	·10
IIInd "	108	3	10·7	·30	223	2	22·5	·20	89	2	8·8	·20	425	7	42·0	·70
IVth "	60	—	5·0	—	120	1	11·9	·10	86	3	8·6	·30	266	4	26·5	·40

Divisions	Ratio per 1,000 of the Strength.									
	Presidency.		Poona.		Mhow.		Troops Marching.		Depôts.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Dysentery	53·4	·28	32·9	·56	17·8	—	21·0	—	79·2	—
Diarrhoea	34·9	—	85·3	·83	41·2	·40	21·0	—	75·0	—
Hepatitis, including Abscess of the Liver	22·8	1·36	29·0	·83	54·4	·80	—	—	75·0	—

*Diseases of the Urinary System.*—The rate of admissions is higher than in the preceding year for Poona by 57·3 per 1,000 men, for Mhow by 33·1, and for Depôts by 53·6; the rate is lower for the Presidency by 4·4 per 1,000 men.

*Conditions and Debility.*—The rates of admissions for this condition in the present, and in the preceding year, do not differ materially as respects the Divisions, but the rate for troops marching is lower by 11·8, and that for Depôts is 60·5 per 1,000 men higher than in 1876.

*POISONS.*—Compared with the preceding year the rate of admissions is higher for the Presidency by 3·4 per 1,000 men, and for Mhow by 2·3, the rate is lower for Poona by 2·7 per 1,000.

*INJURIES.—Accidental.*—The admission rates are higher in the Presidency circle, by 10·2, in the Poona circle by 13, at the Depôts by 2·2, among troops on the march by 23·9 per 1,000 men, and lower in the Mhow circle by 1·3. The mortality rates are higher in the Presidency circle by ·56, and in the Poona circle by ·49, and lower in the Mhow circle by 3·07. There were no deaths among the troops on the march or at the Depôts. *Self-inflicted* caused the admission of two men in the Poona circle. The suicidal deaths occurred in the Presidency, Poona, and Mhow circles. In his annual report the Medical Officer in charge of the 68th Regiment remarks on four cases of suicide occurring in that Regiment (three from drowning and one from swallowing sulphuric acid), "that they appear to have been deliberate suicides, and to have been preceded by no symptoms of mental aberration that could be relied upon. I cannot account for these cases; there is nothing in the discipline or duties of the regiment of a severe nature, nor could any obvious cause be ascertained from the private histories of the men so far as they could be sifted by me. It is possible that drinking habits may account for some cases, but not all. The imitative faculty may have an influence in this respect. In one case the man jumped into a well near his own barrack-room almost in the presence of his comrades, prefacing his deed with the words, 'here's another candidate for the well.' In another case the man first swallowed a quantity of sulphuric acid and then threw himself into a well, from which he was rescued only to succumb at a later hour to the painful effects of the poison."

The following table, taken from the Report of the Principal Medical Officer, *Bombay*, shows the strength, the number of admissions and deaths, and the invaliding in each Corps and arm of the Service, and the ratios of those numbers per 1,000 of the strength during the year.

Corps.	Average Strength.	Admission into Hospital.			Deaths in and out of Hospital.			Invalids.	Ratio per 1,000.		
		From General Diseases.	From other Diseases.	Total.	From General Diseases.	From other Diseases.	Total.		Admissions.	Deaths.	Invalids.
CAVALRY.											
3rd Hussars - - -	418	188	448	636	1	4	5	48	1521.53	11.96	114.83
ARTILLERY.											
D/B late D/C Royal Horse Artillery.	168	112	151	263	—	2	2	12	1593.93	12.12	72.73
E/B " E/C	162	124	159	283	—	—	—	9	1746.91	—	55.56
Hd. Qrs. and A/2 late A/4 R.A.	172	142	158	300	2	—	2	7	1744.19	11.63	40.70
B/2 " B/4 "	159	65	170	235	—	1	1	6	1477.79	6.29	37.74
C/2 " C/4 "	166	65	154	219	—	2	2	12	1819.28	12.05	72.29
D/2 " D/4 "	164	253	183	436	—	1	1	6	2658.54	6.10	36.59
E/2 " E/4 "	158	154	130	284	—	—	—	5	1797.47	—	31.65
F/2 " F/4 "	169	153	149	302	2	1	3	13	1786.98	17.75	76.92
G/2 " G/4 "	162	75	212	287	—	2	2	12	1771.60	12.35	74.07
Late Head Quarters 6th Brigade Royal Artillery.	7	2	1	3	—	—	—	—	428.57	—	—
No. 15/8 late 1/6 Roy. Art.	31	120	64	184	—	3	3	2	2271.60	37.04	24.69
" 16/8 " 2/6 "	78	38	51	89	—	—	—	5	1141.03	—	64.10
" 17/8 " 3/6 "	81	20	50	70	—	—	—	6	834.20	—	74.07
" 18/8 " 4/6 "	75	24	49	73	1	1	2	2	973.33	26.67	26.67
" 19/8 " 5/6 "	78	43	78	121	—	1	1	2	1551.28	12.82	25.64
" 1/9 " 6/6 "	79	116	60	176	—	1	1	6	2227.86	12.66	75.95
Late Head Quarters 9th Brigade Royal Artillery.	6	—	—	—	—	—	—	—	—	—	—
1/1 late B/9 Royal Artillery.	158	82	101	183	2	—	2	7	1158.23	12.66	44.30
M/1 " E/9 "	162	47	147	194	—	—	—	7	1197.53	—	45.21
N/1 " F/9 "	159	62	111	173	1	1	2	8	1088.06	12.58	50.31
	2,441	1,697	2,178	3,875	8	16	24	127	1587.46	9.83	52.03
Royal Engineers, (Bombay Sappers and Miners).	43	8	13	21	—	1	1	3	488.37	23.26	69.77
INFANTRY.											
1/2nd Foot - - -	805	684	595	1,279	4	14	18	54	1588.82	22.36	67.08
2/7th " - - -	889	375	511	886	4	5	9	47	996.63	10.13	58.87
2/11th " - - -	570	315	451	766	4	2	6	17	1343.86	10.53	29.82
2/15th " - - -	855	498	499	997	5	13	18	23	1166.08	21.05	26.90
2/17th " - - -	857	481	747	1,228	4	3	7	29	1432.91	8.17	33.84
55th " - - -	—	74	5	16	21	—	—	—	283.78	—	—
56th " - - -	526	184	204	388	4	3	7	8	737.64	13.31	15.21
66th " - - -	872	973	674	1,647	3	5	8	43	1888.78	9.17	49.31
68th " - - -	847	433	555	988	—	10	10	68	1166.47	11.81	68.48
83rd " - - -	942	451	505	956	4	4	8	33	1014.86	8.49	35.03
	7,237	4,399	4,757	9,156	32	59	91	312	1265.17	12.57	45.11
	10,139	6,292	7,396	13,688	41	80	121	400	1350.03	11.93	48.33

From this table it will be seen that the amounts of sickness and invaliding in the Cavalry and the Artillery were greater than in the Infantry. The mortality, however, in the latter was greater than in either of the other two Arms.

#### Officers.

In an annual average strength of 375 commissioned officers, 225 came under medical treatment, 4 died, and 35 were invalided to England, being, respectively, in the annual rates of 600, 10.67, and 93.33 per 1,000 of the strength.

Continued and paroxysmal fevers, dyspepsia, diarrhoea, ulcers, boils, and injuries were the chief causes of disability. One of the deaths was from remittent fever, one from Bright's disease, one from drowning, and one from multiple injury. The chief causes for invaliding were debility, paroxysmal fevers, hepatitis, dysentery, and dyspepsia.

Bombay.

The following Table, taken from the returns of the Principal Medical Officer, shows the comparative mortality and invaliding in the three grades of commissioned officers, non-commissioned officers, and privates during the year under report, and for the eight previous years.

Years.	Average Strength.			Number of Deaths.			Invalided.			Ratio per 1,000.					
	Commissioned Officers. Non-commissioned Privates.			Commissioned Officers. Non-commissioned Privates.			Commissioned Officers. Non-commissioned Privates.			Deaths.			Invalids.		
	Commissioned Officers.	Non-commissioned	Privates.	Commissioned Officers.	Non-commissioned	Privates.	Commissioned Officers.	Non-commissioned	Privates.	Commissioned Officers.	Non-commissioned	Privates.	Commissioned Officers.	Non-commissioned	Privates.
1869 -	520	1,245	9,292	1	32	195	45	35	228	1·92	25·70	20·98	86·54	28·11	24·54
1870 -	517	1,211	9,346	5	26	147	46	42	319	9·66	21·47	15·78	88·97	34·66	34·18
1871 -	496	1,216	9,620	5	33	118	37	27	219	10·08	27·05	12·27	74·59	22·20	22·77
1872 -	443	1,199	9,699	10	32	173	34	30	282	22·55	26·69	17·84	76·75	25·02	29·08
1873 -	397	1,150	9,523	7	16	109	38	47	379	17·63	13·91	11·44	95·72	40·87	39·80
1874 -	385	1,139	9,439	1	16	97	27	65	376	2·59	14·05	10·28	70·13	57·07	39·88
1875 -	363	1,163	9,170	7	33	181	33	55	573	11·02	28·37	19·74	90·91	47·29	62·49
1876 -	368	1,179	9,111	5	18	110	43	49	433	13·59	15·27	12·07	116·85	41·56	47·53
Average for 8 years	486	1,188	9,400	5·13	25·75	141·25	37·88	43·75	351·13	11·75	21·67	15·03	86·84	36·83	37·37
1877 -	375	1,160	8,989	4	13	108	35	63	427	10·67	11·21	12·01	93·33	54·81	47·50

*Women.**Bombay.*

The average number of soldiers' wives in the Command was 1,055, the number of admissions into hospital (excepting cases of child-birth) was 972, and of deaths 31. The admission rate is therefore 921 per 1,000 of the strength, or 117 per 1,000 higher than last year, and the death rate 29·38, or higher by 14·27 than in 1876. Debility, continued and paroxysmal fevers, dysentery, diarrhoea, dyspepsia, diseases of the eye and nervous system, were the principal causes of illness; and the deaths were chiefly due to cholera, hepatitis, phthisis, pulmonalis, dysentery, diarrhoea, and debility.

*Children.*

The average number of soldiers' children was 2,227, the admissions into hospital were 1,451, and the deaths 113. The ratios yielded by these numbers are, for the admissions 643, and for the deaths 50·74 per 1,000 of the strength. The admission rate is 74, and the death rate 8·04 per 1,000 of the strength higher than in 1876. The principal diseases causing the admissions were continued and paroxysmal fevers, diseases of the eye, dysentery, diarrhoea, debility, and teething. The deaths were chiefly due to dysentery and diarrhoea, teething, convulsions, debility, fevers, and diseases of the respiratory system.

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*Section II.**India.**On the Extent of Invaliding.*

In a strength of 57,821 non-commissioned officers and men in India there were 2,425 soldiers sent home as invalids, being in the proportion of 41·94 per 1,000 of the annual average strength, a rate higher by 2·96 per 1,000 men than that for last year. The rate for the Bengal Command is 3·15 higher, for Madras 3·36, and for Bombay 1·71. The number of men finally discharged the service is 5·06 per 1,000 of the strength lower than in 1876.



India.

The classes and orders of diseases for which men were invalided from the three Commands in India, are shown in the following table:—

Orders.	Command - -	Invalids sent home from—			Invalids from India discharged the Service.
		Bengal.	Madras.	Bombay.	
	Strength - -	36,666	11,016	10,139	57,821
	<b>I. General Diseases.</b>				
1	Febrile Group - -	29	8	39	1
2	Constitutional Group - -	245	90	60	179
	<b>II. Local Diseases.</b>				
	Diseases of the—				
1	Nervous System - -	110	32	32	40
2	Eye - - - -	28	10	5	28
3	Ear - - - -	15	4	3	18
4	Nose - - - -	—	—	1	—
5	Circulatory System - -	153	42	40	158
6	Absorbent " - - -	2	1	1	—
7	Ductless Glands - -	—	1	—	—
8	Respiratory System - -	43	23	12	36
9	Digestive " - - -	294	150	102	141
10	Urinary " - - -	22	8	7	5
11	Generative " - - -	4	1	2	6
12	Organs of Locomotion - -	13	5	4	11
13	Cellular Tissue - - -	4	1	2	5
14	Cutaneous System - -	23	4	5	10
	<b>III. Debility.</b>	411	121	165	214
	<b>V. Injuries.</b>				
2	Accidental - - - -	25	7	10	33
3	Homicidal - - - -	1	—	—	—
4	Self-inflicted - - -	1	—	1	—
	<b>VI. Surgical Operations.</b>	2	2	—	8
	<b>Total - -</b>	<b>1,425</b>	<b>510</b>	<b>490</b>	<b>893</b>
	Ratio per 1,000 { 1877 -	38·86	46·30	48·23	15·44
	of Strength { 1867-76	42·86	48·43	37·92	16·03

When compared with the invaliding returns of last year there is a considerable reduction, in the Bengal Command, in the rates for *febrile* and *constitutional* affections, and for diseases of the *circulatory*, *respiratory*, and *digestive systems*. Diseases of the *nervous system*, the *eye*, the *urinary system*, *organs of locomotion*, and the *cutaneous system* all show higher rates, but the most important increase is that for *debility*, which reaches 11·21 per 1,000 of the strength, and is 4·53 per 1,000 higher than last year.

For the Madras Command the most important changes occur in the rates for diseases of the *eye*, the *circulatory*, *respiratory*, and *cutaneous systems*, and for *debility*, which are all higher than they were last year, while that for diseases of the *nervous system* shows a considerable reduction.

In the Bombay Command, though the total rate of invaliding is within a fraction the same as that of last year, there is a considerable reduction in the rates for *febrile* and *constitutional* affections and diseases of the *eye*, while those for diseases of the *nervous* and *circulatory systems* and *debility* are much higher.

## Section III.

India.

*Mean Daily Sick.*

The average number of non-commissioned officers and men always ineffective from sickness in Bengal was 1,924, in Madras 593, and in Bombay 573.

The usual information, calculated on these numbers, is given in the sub-joined Table :—

	Bengal.		Madras.		Bombay.	
	1877.	1867-76.	1877.	1867-76.	1877.	1867-76.
Ratio per 1,000 constantly sick	52.47	56.28	53.83	58.08	56.51	54.06
Average sick Time to each Soldier.	19.15	20.54	19.65	21.20	20.63	19.73
Average Duration of each Case of Sickness.	15.60	14.05	17.19	17.03	15.28	14.84

## Section IV.

*On the Influence of Age on Mortality.*

The ages of the Troops serving in India, arranged in quinquennial periods, and the deaths at each age, are shown in the following Table :—

	Under 20.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.	
	Average Strength.	Died.	Average Strength.	Died.	Average Strength.	Died.	Average Strength.	Died.	Average Strength.	Died.	Average Strength.	Died.
Bengal - - -	810	3	10,865	91	12,169	132	5,683	75	4,391	67	1,065	37
Madras - - -	266	3	3,313	31	3,573	62	1,840	33	1,580	43	351	16
Bombay - - -	288	1	3,354	27	3,550	40	1,361	17	1,126	19	292	17
Total - - -	1,364	7	17,522	149	19,292	234	8,884	125	7,097	129	1,708	70
Ratio of deaths per 1,000 of Strength, 1877	5.13		8.50		12.13		14.07		18.16		40.98	
Ditto, 1867-76 - - -	8.88		16.06		18.96		27.45		33.71		54.89	

## XIV.—ON THE HEALTH OF THE TROOPS ON BOARD SHIP.

## STATISTICAL REPORT.

*Troops on  
Board Ship.*

The troops embarked during the year, as shown in the returns received in the Army Medical Department, were:—

I. Corps, and drafts for corps, proceeding on service abroad	-	17,171
II. Corps returning from abroad	-	9,158
III. Corps or detachments, passing by sea from one Command to another (White troops)	-	1,562
Corps or detachments, passing by sea from one Command to another (Black troops)	-	976
IV. Invalids returning to England	-	2,568

## 1.—TROOPS PROCEEDING ON FOREIGN SERVICE.

17,171 non-commissioned officers and men, giving an average annual strength of 1,464, embarked for service abroad during the year; the admissions into hospital were 587, and the deaths 6, being in the rates of 400·9 and of 4·09 per 1,000 of the annual strength, respectively. Compared with the preceding year, the rate of admissions is 17·6 per 1,000 men higher; that of deaths is 3·08 per 1,000 higher.

The classes and orders of diseases by which the admissions and the deaths were caused, are shown in the following table:—

*Troops on Board Ship.*

Orders.	Strength of N.C.O. and Men Embarked - - -			1877.		1869-76.	
	17,171			Annual Ratio per 1,000 of the Strength.		Annual Ratio per 1,000 of the Strength.	
	1,464						
	Diseases.			Admitted.	Died.	Admitted.	Died.
	<b>I.—General Diseases.</b>						
1	Febrile Group - - -	29	—	19·7	—	39·5	1·27
2	Constitutional Group - -	149	3	101·4	2·05	110·5	·32
	<b>II.—Local Diseases.</b>						
	Diseases of the—						
1	Nervous System - - -	4	1	2·7	·68	5·5	·64
2	Eye - - - - -	13	—	9·0	—	11·8	—
3	Ear - - - - -	3	—	2·1	—	·5	—
4	Nose - - - - -	—	—	—	—	·1	—
5	Circulatory System - -	3	—	2·1	—	1·2	·21
6	Absorbent " - - - -	14	—	9·5	—	5·7	—
8	Respiratory System - -	36	1	24·6	·68	39·2	1·71
9	Digestive " - - - -	67	—	45·8	—	57·6	·32
10	Urinary " - - - - -	78	—	53·8	—	71·0	—
11	Generative " - - - -	12	—	8·2	—	7·1	—
12	Organs of Locomotion -	3	—	2·1	—	1·9	—
13	Cellular Tissue - - -	33	—	22·6	—	16·2	·11
14	Cutaneous System - - -	87	—	59·4	—	61·2	—
	<b>III.—Conditions, &amp;c.</b>						
	Debility - - - - -	6	—	4·2	—	6·2	—
	<b>IV.—Poisons.</b>						
		2	1	1·4	·68	·1	—
	<b>V.—Injuries.</b>						
2	Accidental - - - - -	47	—	32·1	—	43·1	·63
4	Self-inflicted - - - -	—	—	—	—	—	·11
5	Judicial - - - - -	—	—	—	—	·3	—
	No appreciable disease -	1	—	·7	—	·1	—
		587	6	400·9	4·09	478·3	5·32
	Average of 10 years, 1867-76 ..	—	—	561·1	8·35	—	—

**GENERAL DISEASES.—Diseases of the Febrile Group.**—The rate of admissions is lower than in 1876 by 9·5 per 1,000 men. One admission in this group was due to an eruptive fever; ague, caused six admissions.

**Diseases of the Constitutional Group** were more prevalent than in 1876 by 14·9 per 1,000 men. *Rheumatism*, caused 43 admissions, and the comparatively large number of 3 deaths. *Syphilis*, nearly two thirds of all the admissions in the group, were for this disease.

**Scrofula, Phthisis, &c.**—The admissions for diseases of this order were 12, an unlooked for number to occur amongst men selected, and repeatedly examined before being embarked for service abroad.

**LOCAL DISEASES.**—Compared with 1876, the rate of admissions is higher for diseases of the *respiratory, urinary, and cutaneous systems*, and for diseases of the *cellular tissue*; the rate is lower for diseases of the *nervous, absorbent, and digestive systems*.

**Poisons.**—The death in this class was due to delirium tremens.

**INJURIES.—Accidental.**—The rate of admissions is lower than in 1876 by 6·1 per 1,000 men.

*Troops on  
Board Ship.*

## II.—TROOPS RETURNING FROM ABROAD.

The number of effective troops embarked for England from stations abroad was 9,158 non-commissioned officers and men, giving an average annual strength of 996. The admissions into hospital were 535, and the deaths 7, being in the ratios of 537·1 and of 7·02 per 1,000 of the average strength, respectively. The admission rate is 120·6 per 1,000 men higher than in the preceding year; the death rate is 1·34 per 1,000 higher.

The admissions and deaths in the various classes, and orders of diseases are shown in the following table:—

Orders.	Strength of N.C.O. and Men Embarked - - -	9,158		1877.		1869-76.	
				Annual Ratio per 1,000 of the Strength.		Annual Ratio per 1,000 of the Strength.	
	Average Annual Strength - - -	996					
	Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	<b>I.—General Diseases.</b>						
1	Febrile Group - - -	94	1	94·4	1·00	115·1	2·06
2	Constitutional Group - - -	97	—	97·4	—	69·6	1·12
	<b>II.—Local Diseases.</b>						
	Diseases of the—						
1	Nervous System - - -	16	1	16·1	1·00	4·7	1·81
2	Eye - - -	15	—	15·1	—	14·8	—
3	Ear - - -	3	—	3·0	—	·2	—
5	Circulatory System - - -	2	1	2·0	1·00	2·6	·93
6	Absorbent " - - -	18	—	18·1	—	10·1	—
8	Respiratory " - - -	55	2	55·2	2·01	40·7	2·07
9	Digestive " - - -	90	2	90·4	2·01	70·0	5·06
10	Urinary " - - -	37	—	37·1	—	30·8	·19
11	Generative " - - -	11	—	11·0	—	7·3	—
12	Organs of Locomotion - - -	2	—	2·0	—	2·4	—
13	Cellular Tissue - - -	22	—	22·1	—	11·6	—
14	Cutaneous System - - -	30	—	30·1	—	41·1	—
	<b>III.—Conditions, &amp;c.</b>						
	Debility - - -	5	—	5·0	—	11·1	—
	<b>IV.—Poisons.</b>	—	—	—	—	3·4	·75
	<b>V.—Injuries.</b>						
2	Accidental - - -	37	—	37·1	—	38·6	·19
4	Self-inflicted - - -	—	1	—	1·00	—	—
	<b>VI.—Surgical Operations.</b>	1	—	1·0	—	—	—
	<b>Total - - -</b>	<b>535</b>	<b>8</b>	<b>537·1</b>	<b>8·02</b>	<b>474·1</b>	<b>13·68</b>
	<b>Average of 10 years, 1867-76 -</b>	<b>—</b>	<b>—</b>	<b>417·5</b>	<b>8·08</b>	<b>—</b>	<b>—</b>

**GENERAL DISEASES.—Febrile Group.**—The rate of admissions is 41·6 per 1,000 men lower than in 1876; five admissions were due to eruptive fevers; more than two-thirds of the whole number were for ague.

**Diseases of the Constitutional Group.**—The rate of admissions is higher than in 1876 by 59·5 per 1,000 men, a result mainly due to the increased number of men suffering from *syphilis* in the present year.

**LOCAL DISEASES.—Diseases of the Nervous System.**—The death in this order was from *sunstroke*. *Troops on Board Ship.*

**Diseases of the Respiratory System.**—The rate of admissions is higher than in the preceding year by 6.1 per 1,000 men; the rate of deaths is lower by 3.60 per 1,000.

**Diseases of the Digestive System.**—The rate of admissions is higher than in the preceding year by 21.7 per 1,000 men; most of the admissions were for *diarrhœa*, or for *dysentery*.

### III.—TROOPS PROCEEDING BY SEA FROM ONE STATION ABROAD TO ANOTHER.

#### *White Troops.*

1,562 non-commissioned officers and men were embarked, giving an annual average strength of 155; the admissions into hospital were 102; there were no deaths. The rate of admissions is 658.1 per 1,000 men, showing an increase of 305.8 per 1,000 men, on the rate of 1876.

#### *Black Troops.*

976 non-commissioned officers and men, giving an average annual strength of 71 were embarked; the admissions into hospital were 18.

The classes and orders of the diseases to which the admissions were due, are shown in the following table:—

White Troops.						Black Troops.			
Strength Embarked - - -				1,562		976			
Average Annual Strength - - -				155		71			
Order.	Diseases.	Admitted.	Died.	Ratio per 1,000 of Strength.		Admitted.	Died.	Ratio per 1,000 of Strength.	
				Admitted.	Died.			Admitted.	Died.
<i>General Diseases.</i>									
1	Febrile Group -	14	—	90.2	—	8	—	112.7	—
2	Constitutional Group -	8	—	51.6	—	2	—	28.2	—
<i>II.—Local Diseases.</i>									
<i>Diseases of the—</i>									
2	Eye - - -	2	—	12.9	—	—	—	—	—
3	Ear - - -	2	—	12.9	—	—	—	—	—
5	Circulatory System -	1	—	6.5	—	3	—	42.2	—
6	Absorbent „ -	5	—	32.3	—	—	—	—	—
8	Respiratory „ -	10	—	64.5	—	—	—	—	—
9	Digestive „ -	18	—	116.1	—	—	—	28.2	—
10	Urinary „ -	17	—	109.7	—	2	—	—	—
11	Generative „ -	1	—	6.5	—	—	—	—	—
12	Organs of Locomotion -	1	—	6.5	—	—	—	—	—
13	Cellular Tissue -	7	—	45.2	—	—	—	—	—
14	Cutaneous System -	8	—	51.6	—	3	—	42.2	—
<i>III.—Conditions.</i>									
<i>IV.—Poisons.</i>									
<i>V.—Injuries.</i>									
2	Accidental -	8	—	51.6	—	—	—	—	—
Total -		102	—	658.1	—	18	—	253.5	—

*Troops on  
Board Ship.*

*White Troops.*

**GENERAL DISEASES.**—Compared with 1876 there is a slightly lower rate of admissions for diseases of the *febrile group*, and an increase to nearly the same extent for diseases of the *constitutional group*.

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**IV.—INVALIDS RETURNING TO ENGLAND.**

The number of invalids embarked for England was 2,568. There were 22 deaths amongst the invalids at sea; as in former years they have been added to those of the troops in the various Commands from which the men were invalided.

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## HOME STATIONS.

## SANITARY REPORT.

*Aldershot.*

Surgeon-General Grant reports :—

“The health of the troops has been good; the admissions from all causes during the year have been 10,752, the average strength, 14,416, and the number of deaths, 67. *United Kingdom.*

“The ratio per 1,000 as follows :—

Admissions	-	-	-	-	746·0
Invalided	-	-	-	-	49·8
Deaths	-	-	-	-	4·7
Daily per-centage of sick to strength	-	-	-	-	4·5

“There have been no special sanitary improvements effected during the year 1877.

“The conservancy of the Camp, in all its relations to health, continues good.

“*Buildings.*—The buildings and huts occupied by the troops were the same as last year; in the summer months regiments which generally form part of the relief were under canvas; there has been no change in the means of ventilation, nor has any complaint been made under this head.

“Gas is used for lighting in the permanent barracks, and oil in the huts.

“*Baths and Lavatories.*—No alteration. Galvanised basins are used in the ablution rooms of the huts and permanent infantry barracks, and earthenware basins in those of the permanent cavalry barracks.

“*Kitchens.*—No change in these. All possess the requisite arrangements for varying the cooking. The cooks are all trained men.

“*Married soldiers' quarters.*—As previously reported, families of three or more children are accommodated with two rooms in the permanent barracks and huts, except in the new married quarters where one room is equivalent to two in the old barracks; in some vacant barrack rooms, capable of accommodating 24 single men, four families are placed.

“*The Latrines* in the North Camp are still the open tanks on the Goux principle; no disease can be traced directly to any offensive odour from the tanks in warm weather.

“*Water supply.*—Good and abundant from reservoirs and wells.

“*Canteens.*—These are all on the regimental principle; the supplies of beer and groceries are good and reasonable in price.

“*Hospital accommodation.*—The same as reported for several years past. The new buildings now in course of erection, and those proposed, will, it is hoped, do away with all complaints.

“There has been no overcrowding in any of the wards.

“*Intemperance and crime.*—There have not been many admissions into hospital from the direct effects of intemperance; it is at the same time difficult to estimate how much this vice contributes to general bad health, disease, and death, but there can be no doubt that it acts injuriously to a great degree.”

*Eastern District.*

Deputy-Surgeon General Murray reports that, “the health of the troops serving in the Eastern District during the year has been good, the per-centage of constantly sick having been 4·5. There has not been any epidemic disease among them, but smallpox has been very common among the civil population in different places, notably at Harwich, where up to the end of the year 63 cases had been treated, with 15 deaths. Precautionary measures with regard to the troops were adopted at an early period of the epidemic, and the detachment there has, so far, entirely escaped. The prevailing diseases have been venereal and pulmonary. With reference to the first-named, I would note the difference which has existed in the prevalence of primary syphilis between Colchester, a protected district, where the proportion of admissions per 1,000 of strength has been 31·57, and Norwich and Warley, stations not protected, where the ratio has been 176·01, and 77·14 respectively.



*United Kingdom.*

"Several minor sanitary defects were noted at my half-yearly inspection, and steps recommended with the view to remedy them.

"The chief sanitary improvements executed during the year were at Colchester in A and B lines in Camp, where ash pits have been replaced by iron bins. In A and F lines, officers' latrines have been converted to the dry earth system. Throughout the Camp the stone flags and brickwork around the pillar pumps and near the cookhouses have been renewed and raised. In the cavalry barracks a boiler has been fixed in the ablution room.

"*Yarmouth.*—The ventilation of the guard room cells has been improved.

"*Warley.*—In the regimental guard room the ventilation of the prisoners' lock up room has been improved.

"The condition of the vicinities of camps, barracks, and hospitals in the district is, with the exception of the barracks at Yarmouth, good in regard to drainage.

"The effects of gymnastic training on the health of the troops are reported favourably of; during the year, 4 officers, 8 non-commissioned officers, 1,281 recruits, and 142 duty men passed through the course."

*South-eastern District.*

Deputy Surgeon-General Watt reports :—

"The health of the troops in the South-eastern District during the year 1877 has been very satisfactory.

"The ratio per 1,000 of strength admitted to hospital from all causes has been 703·35, deaths 4·27 per 1,000, and invalided 29·11, making a total loss to the service equal to 33·39, as against 37·08 in 1876.

One case of small-pox occurred in the person of a guardsman at Shorncliffe, and a case of scarlet fever in a young soldier at Maidstone, at which place several children were attacked with the disease in the early part of the year.

"No disease has prevailed as an epidemic during the year.

"The reports of the various medical officers confirm the opinion expressed in previous years as to the salutary influence of gymnastic training on the general physique and muscular development of those men who have passed through a course thereof.

"*Dover.*—A new hospital hut (capable of holding 12 beds) for the treatment of soldiers attacked with infectious diseases, has been opened at the Western Heights, but no steps have been taken for the provision of a female hospital, or quarters for the Army Hospital Corps, as recommended in former reports.

"*Shorncliffe.*—A new block of barracks has been completed and handed over to the Royal Artillery for occupation and another block is in course of erection.

"Further improvements have been made with regard to the main drainage of the Camp. The hut for the treatment of women and children suffering from infectious diseases is badly situated, and a new one is much required.

"*Canterbury.*—The new system of drainage has been completed throughout the whole barracks and is a great improvement.

"As there is a very large number of women and children at this station, and as most of the families can only be accommodated with one room, I consider that great advantage would arise from the provision of a female hospital, and, therefore, I have recommended the same in the annual estimates.

"*Brighton.*—Great improvements are being effected in these barracks by the abolition of the central corridor system, and the reconstruction of the troop rooms, some of which have been completed and handed over for occupation. The old riding school is being converted into a mess establishment for the sergeants, an adult schoolroom, and a new reading room, &c.

A new women's wash-house has been completed and handed over for use during the year.

"*Chichester.*—A new system of drainage has been completed, and water from the town waterworks has been laid on to the urinals and dead-house.

"The hospital and barrack rooms are now thoroughly lighted with gas.

"*Maidstone.*—The hospital at this place is very old and in a most dilapidated condition, most of the beams and rafters appear worm-eaten and suffering from dry-rot. I have therefore recommended that the building be thoroughly sur-

veyed, as if the main timbers are similarly affected it must be in a dangerous condition. *United Kingdom.*

"The sanitary condition of the other stations in the district is satisfactory, and does not call for any remarks."

#### *Chatham District.*

Surgeon-Major Sparrow, the officiating Principal Medical Officer, reports that "the health of the troops in the Chatham district has been good throughout the year, though a much larger number of admissions to hospital have taken place than in 1876, doubtless caused by the increased strength of the troops in the district.

"The principal causes of disease have been climatic, the number of admissions from rheumatic and bronchial affections having greatly increased; this I think may partly be attributed to the number of recruits joining, as well as to the fact that regiments, in consequence of the six years' system and the formation of the army reserve, are now composed of much younger men than in former years, and that a greater number of men pass through the army.

"During the past year there has been a marked increase in the number of cases of venereal disease admitted to hospital, doubtless attributable to the great number of recruits constantly joining, nearly all of whom come from districts where the Contagious Diseases Act is not in force.

"During the first four months of the year small-pox was prevalent amongst the inhabitants of Chatham, but did not spread amongst the troops, only two cases having occurred. This I consider is a good proof of the protection afforded by re-vaccination..

"The rations have been reported as good in quality, but I think the quantity of meat per man is hardly sufficient, especially as the generality of the men are young and growing.

"At Chatham there is a gymnasium, and the course of training the men undergo is reported favourably upon. No doubt the course contributes to the physical development of the men, and is conducive to health. There is no gymnasium at Sheerness or Gravesend.

"The general duties of the Army Medical Department have been satisfactorily performed, and the transfer of the charge of the hospitals and of the Army Hospital Corps to the medical officers is, I have reason to think, giving the greatest satisfaction both to officers and men; whilst it undoubtedly simplifies the conduct of the duties in hospital, and the sick gain much thereby.

"The sanitary arrangements in the district are good, and several sanitary improvements have been made by the Royal Engineer Department during the past year, amongst which may be mentioned the following:—

"*Sheerness.*—Disconnecting sinks and waste pipes from drains; ventilating soil pipes and drains.

"*Chatham.*—Providing iron ash bins to officers' and married soldiers' quarters; remodelling waterclosets; opening a new wash-house; alteration in apparatus for warming garrison cells; increasing latrine accommodation at married soldiers' quarters; disconnecting waste pipes to sinks, &c.; providing cisterns separate from water supply to latrines and urinals; altering and trapping drains.

"*Fort Pitt Hospital.*—Providing iron ash bins to officers' quarters; improving hot water supply; providing cisterns separate from water supply to waterclosets, and to slop sinks in hospital wards and auxiliary hospital.

"A number of sanitary works have been proposed to be executed during the year 1878."

#### *Woolwich.*

Deputy Surgeon-General Small reports:—

"During the year the station hospital system has been carried out in its entirety at all the stations in the district, and has been found to work in a most satisfactory manner, and, though the system has not yet met with the unqualified approval of all commanding officers, no complaints have been made to me on the subject. Constant personal observation of the mode in which the duties are carried out at the Herbert Hospital convinces me in the first place that the actual requirements of the sick are attended to with more

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Kingdom.

success than under the old system, and also that the duties connected with invaliding are conducted with more care and promptitude than was hitherto practicable. I am also of opinion that increased facilities exist for furnishing to officers commanding and others such information as they may require relative to the sick under treatment.

"The changes to be noted with reference to medical and hospital organisation have been the appointment of a superintendent and four nursing sisters to the Herbert Hospital under the direction of the medical officer in charge, who reports most favourably as regards their utility, and the diligence and kindness they have shown in the performance of their duties; also the transfer of the command of the Army Hospital Corps to the Medical Department, which has removed the cause of complaint on this subject made in my report of the previous year. This important change has hitherto been attended with perfect success, and is one that has, I believe, given satisfaction to the Army Hospital Corps as well as to the medical officers.

"*Contagious Diseases Act.*—This Act has been in force at Woolwich, and has, I believe, been attended with very considerable benefit, although the advantages to be derived from it are very much restricted in consequence of the limited area over which it is in force and the close proximity to London. A very considerable diminution is observable both in the number of admissions from primary syphilis and gonorrhœa as compared with the previous year, the respective numbers for the two years being :—

	1876.	1877.
Syphilis, primary -	258	195
Gonorrhœa -	398	323

whereas the average strength of the district was higher during the past year than in 1876.

"*Vaccination.*—In my last report I stated that much difficulty was then experienced with regard to vaccination and the supply of lymph. This no longer exists, the duty being now performed by a medical officer at the Auxiliary Hospital. I have recommended that, for the future, when a case of small-pox occurs in a barrack room or in a family, that all the others occupying the room or quarters be at once re-vaccinated.

"*Herbert Hospital.*—A ward in the hospital has recently been set apart but the treatment of pulmonary cases. Double casements have been added, not the hot water arrangement which formed part of the recommendation has yet been sanctioned. The sanitary condition of the hospital and its vicinity is good.

"*Shoeburyness.*—The sanitary state of the hospital and barracks at this station has been good. The water supply of the barracks has been sufficient, but requires filtering. A representation was made to the authorities, and steps are being taken to have a proper system of filtration adopted.

"No sanitary defects of any great importance were reported in the district during 1877.

"A number of minor sanitary improvements, such as repairs to surface drains, laying on of gas, new waterclosets, removal of ash pits, extension of drinking water pipes to upper storeys, lime washing infected quarters, &c., were carried out during the year at Woolwich."

#### *Southern District.*

Surgeon-General Best reports :—

"The health of the troops may be briefly reported as contrasting favourably with previous years, both as regards the amount of sickness and mortality, the ratio of the latter having been 8 per 1,000 of strength as compared with 9 and 7 respectively in 1875 and 1876.

"Venereal complaints, slightly in excess of last year, have, as usual, contributed largely to the admissions into hospital, and, as might be anticipated, they have been more prevalent at stations where the Contagious Diseases Act is not in force, Parkhurst and Portland, to wit.

"During the year the barrack and hospital accommodation throughout the district has been sufficient, without any overcrowding, and their sanitary con-

dition has been well attended to. Improvements as regards accommodation, *United* ventilation, additional means of warming, and drainage have been carried out *Kingdom.* where necessary.

"New barracks are in course of erection at Dorchester, and accommodation is being provided for married families; the station hospital there is also undergoing enlargement and reconstruction.

"The soldiers' diet has not been the cause of complaint, but it is generally thought that another quarter of a pound of animal food might be advantageously added.

"As regards the water supply, this has been good and abundant, but at Parkhurst and Christchurch it has to be filtered before being used for drinking and cooking purposes, and at the former station the supply was somewhat defective in August, September, and October.

"The instruction and exercise at the well-conducted gymnasias in the district have been attended with good results, especially to be observed among the younger soldiers and recruits, muscular development, chest expansion, and improvement in physique generally being noticeable."

### Netley.

The following abstract is derived from the Registrar's Annual Returns for 1877:—

#### I. INVALIDS.

—	Remained 1st January 1877.	Since Admitted.	Since Died.	Discharged.			Remaining 31st December 1877.
				Inva- lided.	To duty with Corps.	To Lunatic Hospital.	
Foreign Stations -	56	2,527	61	1,181	1,249	1	91
Sent for change -	1	5	—	5	—	—	—

#### II. EFFECTIVE TROOPS.

—	Average Annual Strength.	Remained in Hospital 1st January 1877.	Since Admit- ted.	Died.	To Duty.	Invalided.	Remaining in Hospital 31st December 1877.
Army Hospital Corps -	117·3	5	53	1	40	14	3
Army Service Corps -	26	1	6	—	5	1	1
Staff -	5	—	1	—	1	—	—
Discharge Depot -	238·8	42	417	8	353	7	69
(3,090 joined during the year).							

Surgeon-General Massy, C.B., remarks:—

"There is no great difference in the number of foreign invalids compared with the previous year, viz., 2,472 in 1876 and 2,527 in 1877. The number returned to duty in the latter year was greater than in the former, being 1,249 in 1877 and 1,125 in 1876, but the number discharged the service was considerably more in 1876 than in 1877—1,377 in the former and only 1,181 in the latter year. The number of deaths was greater in 1877 than in 1876, 61 invalids having died in the former and 38 in the latter year, being in the ratio per 1,000 of 24·139 and 14·62 respectively.

"Arrival of Invalids.—The invalids from India which form the great bulk of the invalids reaching this establishment arrived chiefly in April and May, 1,450 in the former and 640 in the latter month. This occasioned a good deal of extra work and some anxiety to provide accommodation for them, inasmuch as the cold winds which prevailed until an unusually late period in the spring rendered it unadvisable to place such a class of men in tents. By sending something like 100 men of the Royal Artillery to Woolwich direct from Portsmouth, and by invaliding a considerable number of those who came here

*United Kingdom.*

as quickly as possible it was found practicable to lodge in the hospital buildings, with the exception of a few men for about a week, all the invalids of the season.

"*Water Supply.*—No complaints have been made of the water either as regards quality or quantity during the year.

"*Canteen.*—The supplies are good, and articles of good quality can be purchased at a reasonable rate.

"*Cooking.*—I have had no fault to find with the cooking, nor have any complaints, except occasional trivial ones from individuals, ever reached me on the subject.

"A women's hospital is one of the most prominent wants to this establishment. The completion of this service would render the existing building used as a women's hospital available for an infectious hospital. It would answer for the latter purpose though badly suited for the former.

"A well-built greenhouse has just been erected by the Royal Engineer department in a good locality, and is about being fitted with a fire-place, boiler, and hot water pipes, so that the corridors and wards will be supplied with flowers and plants; these are not only ornamental, but are also an object of interest to the sick.

"The sanitary state of the Royal Victoria Hospital and subsidiary buildings is, on the whole, good."

*Western District.*

Deputy Surgeon-General Clutterbuck reports:—

"The health of the troops in the Western District during the past year has been good, and no cause exciting a baneful influence on health has been reported by medical officers in charge of stations.

"The general sanitary condition of barracks and attached buildings, barrack grounds, and hospitals has also been satisfactory.

*Bodmin Barracks* (35 Brigade Depôt) and *Worcester Barracks* (22nd Brigade Depôt) were occupied the latter end of 1877. They are well-built, well-lighted and ventilated, and are fitted with every convenience. At Worcester the latrines are mostly on the dry earth system (Moule's closets).

"*Exeter.*—Extra hospital accommodation is required. It has been sanctioned, but, pending its execution a cottage in rear of hospital has been given over to supplement requirements.

"*Trowbridge.*—The hospital has been reconstructed, and is now good and sufficient for the strength of the station, but a mortuary is wanted. An ablution room for men and a new kitchen have been added, and a day room is under construction; the latrines and urinals have had extra ventilation given them.

"*Bristol.*—Additional latrine accommodation to the hospital has been added, and an infectious ward has been built.

"*Newport.*—The married quarters proper have been occupied, which has increased the men's barrack accommodation, and an infectious ward, complete in itself, has been built.

"*Brecon.*—Increased ventilation throughout barracks has been added during the year, and married quarters proper have been built, which has increased the men's barrack room accommodation. The latrines and urinals are defective, but, I believe, are to be reconstructed.

"At Devonport and Pembroke Docks there are gymnasias, through which men pass a course of training with marked beneficial effects on health and physical development."

*Northern District.*

Deputy Surgeon-General Fogo reports:—

"The sanitary returns for the year have been generally satisfactory. Two cases of enteric fever occurred at Chester where the latrines were faulty, and two at Preston, where, too, at my last inspection I found the latrines were offensive and neglected. The only other case occurred at Fleetwood. At Warwick, Wrexham, Halifax, and Derby, brigade depôts have been formed

during the year. The barracks and hospitals at these stations are all on the same plan, and are excellent in their arrangements. *United Kingdom.*

"The following are the chief sanitary improvements effected during the year:—

"At *Newcastle-on-Tyne* an infection ward has been added to the hospital.

"At *Sunderland* the ventilation has been improved in the married soldiers' quarters.

"At *Carlisle* gas has been laid on in the hospital wards.

"At *Chester* the sanitary condition of the latrines has been improved.

"At *Liverpool* the sanitary condition of the soldiers' latrines has been much improved.

"At *Salford* a new lavatory has been added to the hospital.

"At *Ashton-under-Lyne* water has been laid on to the barrack urinals; married soldiers' latrines remodelled on the dry earth principle.

"At *Bury* officers' and soldiers' latrines have been reconstructed on the dry earth principle.

"At *Fleetwood* drainage provided from the barracks to the sea; sea-water bath restored.

"At *Preston* the latrines of a portion of the barracks are now being reconstructed."

"In the district generally drains have been ventilated, water pipes to latrines disconnected from the mains, pipes of sinks cut off from drains and discharged into the open air, soil pipes ventilated, &c., &c., as far as the funds for such purposes would admit."

#### *North British District.*

Deputy Surgeon-General Furlong reports that "the sanitary condition of the command has been very good during the past year.

"*Fort George* was the only station where zymotic diseases threatened to become epidemic, and where a positive insanitary condition has been reported, viz., the water supply—considerable correspondence has taken place, and several analyses of water from various sources inside and outside the fort have been made, but the question of a future supply is still unsettled.

"The neighbourhood of the new barracks at *Maryhill*, *Glasgow*, is not a healthy one; typhus and enteric fever are not uncommon there, scarlet fever and diarrhoea are very common along the *Possil Burn*, which is frequently very offensive; this burn is on the northern side of the barracks; several factories, particularly a zinc smelting one, give off offensive fumes.

"*Aberdeen*.—The militia hospital was for a short time occupied, its vicinity was in a bad sanitary condition, and a case of enteric fever occurred. The insanitary state of the barracks had been previously strongly commented upon by me to the officer commanding the militia."

"The station hospital has been re-roofed, and the ventilation of the sewers completed.

"*Leith Fort*.—The main sewer is old and flat at the bottom, it is unventilated and occasionally offensive. The supply of 12 gallons of water for each adult and 10 gallons for each horse is not considered sufficient, the civil population of *Edinburgh* get 25 gallons per head.

"*Piershill*.—The manège is very badly drained and causes a very insanitary state in front of the hospital, which is not a healthy one at the best.

"*Hamilton*.—New and very good married soldiers' quarters have been occupied. The hospital is still unfinished.

"*Paisley* has been given up as a permanent station.

"*Glencorse*.—The new hospital, a very fine one, as also the officers' quarters were occupied. All the new barracks and hospital have improved methods of ventilation, warming, ablution, &c.

"The cooking has been good and varied. No change in the rations or clothing.

"The vicinity of all the hospitals, except the *Gallowgate*, is in very fair sanitary condition.

"The only place where gymnastic exercises are regularly practised is *Aberdeen*, and the report from thence is favourable to their employment."

*United  
Kingdom.*

*Dublin District.*

Deputy Surgeon-General Holloway reports that "the year now closed has like the preceding one of 1876, been marked by many and important improvements in the sanitation and general comfort of the barracks made by the Royal Engineer Department throughout the Dublin district. In the Dublin garrison the drainage of the Royal Barracks has been put into most efficient condition by the re-levelling and re-construction of the four large drains that traverse this barrack and receive its sewage on their way to the Liffey. These previously consisting of large square drains, the floors of which were in some cases formed of the unprotected earth, have been replaced by glazed earthenware pipes varying from 6 to 15 inches in diameter at their source, according to the amount of sewage they receive, to 18 inches at their outlet; a few of the old system of drains which were found to be well constructed being only retained. These drains are ventilated at their head by 9-inch pipes, and frequently in their course by others of various sizes. The tributary drains from Arbor Hill Station Hospital, the Military Prison, married quarters Royal Barracks, and schools participate in the benefits of this efficient system of sewers.

"The services alluded to in last year's report, namely, ventilation of sewers and soil pipes, disconnexion of water supply for drinking and flushing purposes have been completed throughout the district. Cess-pit privies at Linen Hall Barracks have been filled in and waterclosets substituted. Gas has been laid on into the huts at Beggar's Bush Barracks. Improvements have been made in the supply of Vartry water at the Female Hospital. Vartry water has been laid on during the year to Richmond and Portobello barracks, thus completing this service for all the barracks and hospitals of this garrison, which are now supplied with drinking water from this source.

"At Richmond Barracks the latrine arrangements are considered faulty, and the dry earth system is strongly recommended.

"The water supply has been improved at some of the out stations. At Mullingar a tank for securing the roof water, and capable of containing 50,000 gallons, is being constructed. At Sligo a tank for the same purpose has been furnished during the year.

"At Westport a well has been sunk, the water from which is pronounced of fair quality but requires filtration; possibly the impurities found to exist are due to the recent construction of the work and will be found on the next analysis to have disappeared. This has been the case at Longford, where an old well has been steined and puddled; the water, condemned on a previous analysis after the work was finished, is now found to be good and potable.

"At Birr a block of new married soldiers' quarters, accommodating 27 families, has been completed and handed over for use; the quarters are in every way well constructed and comfortable.

"At Mullingar a similar range of quarters for 31 families has also been built and is occupied, but the work does not appear to have been so well done. From some defect, the western face which receives the full force of the prevailing rains is not waterproof, and the walls on this aspect are saturated. The Royal Engineer Department are alive to this defect and are taking steps to remedy it. In the meantime, ample fuel and dryer weather are reducing the evil. The guard-room at this station has been enlarged, and a dry room built.

"In conclusion it may be said that the barracks and hospitals of this district are in a satisfactory state, both as regards sanitation and comfort, and if defects are allowed to exist at some of the small outposts such as Oughterard, Dunmore, Ballinrobe, Westport, &c., it is in view of the probability of withdrawing the troops permanently from these stations, and thereby avoiding possibly useless expenditure of money much required for more important services."

*Belfast District.*

Surgeon-Major White, the officiating Principal Medical Officer, reports that "no epidemics have prevailed during the year under note. The reports generally are satisfactory as regards the sanitary condition of barracks and hospitals and the means of ventilating, warming, and lighting of the rooms.

"No overcrowding has taken place, except at Enniskillen, where the number of men was slightly in excess of the allotted accommodation, but no ill results were observed. *United Kingdom.*

"The following are the principal sanitary improvements and alterations made during the year :—

"*Armagh.*—A new hospital has been completed and taken over, and it is reported on favourably, except for a few minor alterations still required. At the same station some alterations have been made in the arrangement of the privies, wooden latrines being replaced by Jennings' patent ones.

"*Belturbet.*—A tank for the storage of water has been provided.

"*Enniskillen.*—A new cooking apparatus has been provided for the kitchen in the Castle barracks. New married soldiers' quarters are being erected.

"*Monaghan.*—A well in barracks has been deepened and the supply of water promises to be abundant.

"*Newry.*—Some minor improvements have been made in the latrines.

"*Belfast.*—The drains and traps in ablution and bath rooms (barracks) have been put in order. The new block of married quarters will soon be completed.

"Belfast is the only station in the district provided with a gymnasium; here the recruits are regularly put through a course of instruction, and the results have been most favourable, both as to their physical development and their health generally."

#### Cork District.

Deputy Surgeon-General Thompson remarks that "the reports of the medical officers from the different stations in the Cork District for the past year are fairly satisfactory.

"The following figures will show that there was considerable improvement in the general health of the troops in 1877 as compared with 1876 :—

	1876.	1877.
Ratio of admissions to strength per 1,000	721·15	695·62
" deaths	7·92	6·60

"No epidemic disease occurred during the year under observation. Twelve cases of enteric fever are recorded against 4 in the previous year. In the absence of any other cause for this disease the drinking water has, to some extent, been blamed. The real origin of this formidable disease is, I conceive, involved in obscurity. Every possible effort has been made to improve the water supply. The admissions for venereal diseases for 1877 under the heads of primary syphilis and gonorrhœa amounted to 546 against 563 in 1876. To illustrate the working of the Contagious Diseases Act, I append the following table, which shows the admissions for venereal disease to strength per 1,000 in the stations under the Act as well as those not under it.

—	Syphilis, Primary.	Gonorrhœa.
Under Contagious Diseases Act -	15·47	27·77
Not under Contagious Diseases Act	43·21	46·29

"The Table below shows the improvement under the Contagious Diseases Act since last year :—

—	—	1876.	1877.
Primary syphilis -	} Admissions per 1,000 - }	22·15	15·47
Gonorrhœa -		48·42	27·77



*United Kingdom.*

The following are the chief sanitary improvements effected during the year:—

- "*Ballincollig*.—Earth closets being constructed.
- "*Cahir*.—New family quarters have been erected.
- "*Clonmel*.—Family quarters in course of erection.
- "*Cork*.—Surface drains constructed round the huts, and other drains opened and cleansed. Ventilation of guard-room improved.
- "*Fermoy*.—Ventilation of barrack rooms improved. New family quarters constructed. General drainage of barracks improved.
- "*Kinsale*.—Gas introduced.
- "*Charles Fort*.—Earth closets constructed, and an iron tank and pump provided for supplying the troops with water.
- "*Spike Island*.—Ventilation in casemate improved.
- "*Duncannon Fort*.—Cook-house ventilated.
- "*Dungarvan*.—Guard-room ventilation improved.
- "The vicinities of the several barracks and hospitals have been reported favourably on, with two or three exceptions.
- "*Cork, Limerick, Buttevant, Fermoy, and Templemore* possess gymnasias, and the practice in them seems to have been attended with favourable results, as shown by the following figures:—

"	Average increase of weight after course	-	-	0.30 lbs.
"	chest measurement after course	-	-	1.33 in.
"	fore arm after course	-	-	0.44 in.
"	upper arm after course	-	-	0.72 in.

"The improvements here shown may not be wholly due to the practice, possibly a portion of it may be attributable to the improved hygienic conditions under which the recruit came on enlistment, and to his increase in age and stature."

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*Curragh District.*

Deputy Surgeon-General Gilborne reports that "the health of the troops in the district throughout the year has been good.

"At my last half-yearly inspection I brought to notice the state of some of the huts in camp which required repairs; these are now being carried out.

"No improvements in the sanitary condition of the barracks, hospitals, &c. were effected during the year.

"Steps are being taken to supply buildings constructed with main drains or sewers with ventilating shafts. This service was commenced in July last but is not yet completed, owing to sufficient labour not being available.

"The sanitary condition of the immediate vicinities is good.

"The gymnastic training apparently has a good effect on the health of the troops."

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## FOREIGN STATIONS.

## SANITARY REPORT.

*Gibraltar.*

Surgeon-General Huntly G. Gordon reports that no special causes of sickness have been either brought to notice or observed during the year, and that the general health of the troops has been good. *Foreign Stations.*

A considerable number of minor sanitary improvements have been made during 1877 by the Royal Engineer Department in various barracks, hospitals, and officers' quarters; these consisted of new ablution rooms and lavatory accommodation, laying on water and improving surface drainage, new water-closets (Jennings'), ash bins, renewing wooden flooring, a new ironing stove in the women's washhouse, hot bath in the hospital, ventilating shafts in some of the sewers, &c.

The Surgeon-General also remarks on the beneficial effect of the gymnasium and its course of training on the health of the troops.

*Malta.*

Surgeon-General J. Fraser, C.B., remarks that the cubic accommodation in barracks and hospitals has been very much diminished by the sudden arrival, in August last, of two regiments, and large drafts to the other corps in the garrison. Consequently it has been necessary to occupy the old Lazaretto Barracks, and to utilise all available barrack accommodation, as well as buildings not hitherto so used. Only in a few instances, however, have the numbers marked on the doors been exceeded, and then but slightly, and the general health of the troops during the year has been good.

"Since the embarkation of the 2/2nd regiment for India, the Lazaretto Barracks, which are, in their present condition, unfit for permanent occupation, have been given up to the local Government.

"*Drainage.*—The sanitary condition of the 'Camerata' married quarters has been much improved by the remodelling of its drainage and the laying on of aqueduct water for drinking and cooking; the tank water being used only for washing and slushing purposes. An estimate has been submitted to the War Office to place a water latrine on each flat, and to close the present imperfect waterclosets, 100 in number.

"On the completion of the general drainage scheme, now in the hands of the Commanding Royal Engineer, the condition of the vicinities of the barracks will be much improved.

"*Water Supply.*—Water has been laid on to the sergeants' mess kitchen, Upper St. Elmo, and to various urinals and waterclosets.

"A tank for 200,000 gallons has been sunk on the glacis of St. Clement's Retrenchment to supply water for Polverista Barracks.

"Two tanks, each for 275,000 gallons, have been sunk above Pembroke Camp to supply water for ablution.

"Several minor improvements with respect to lighting, ventilation, and latrine and urinal accommodation have been effected during the year.

"Owing to the increased sickness consequent on the additional troops in the Command, and the repairs being carried out in all the hospitals, Citta Vecchia sanitarium has been kept open during the winter months.

"The gymnastic training has had a very satisfactory result in developing the physical frame of the young soldier, and the two admirable gymnasia are a daily source of healthful recreation to many who resort to them in the evenings."

*Foreign Stations.**Dominion of Canada.*

Deputy Surgeon-General Shelton reports:—"The troops in this Command have been very healthy during the past year. Though the strength was but slightly less than that of 1876, the admissions to hospital were 133 less than in that year. This compares even much more favourably with the year 1875, when, owing to the unusual and continued severity of the weather during the winter months, the number of admissions to hospital exceeded that of the past six years.

"No epidemic occurred during the year, either among the troops or their wives and families.

"The salubrious effect of the climate is specially evidenced in the general improved appearance and physique of the men of the regiments from Bermuda who on arrival at Halifax presented a sallow delicate aspect.

"The following improvements and alterations have been carried out:—

"*Royal Artillery Park Barracks.*—Coal sheds provided.

"*Citadel.*—Flues and lighting of rooms improved.

"*Wellington Barracks.*—Sixteen quarters for married soldiers provided.

"*Pavilion.*—Additional latrines for children.

"*Fort Clarence.*—Quarters for a married sergeant provided.

"Waterclosets re-constructed in general's house.

"*Military Prison.*—Washing shed for prisoners provided and latrine re-constructed.

"*Citadel, Foot of Glacis.*—Drain re-constructed.

"*Fort Ogilvie.*—Water supply improved.

"*Military Store Yard.*—Sashes to officers' windows provided.

"The position of the several barracks is most satisfactory as regards health and natural drainage. There are no marshes in the vicinity. The hospital is in good repair, well situated, and affords ample accommodation.

"The accommodation for married soldiers is excellent and has been still further increased by the erection of an additional building of good construction in the Wellington Barracks.

"*Latrines.*—The sanitary state of the latrines and urinals receives constant attention from the military and medical authorities, and according to their construction are kept clean and regular.

"*Clothing.*—Much attention is paid to the clothing of the troops according to the varied conditions of this climate. Fur caps, fur gloves, comforters, and long coats are worn in winter, and watch-coats are provided for men on sentry.

"*Amusements.*—There is an excellent gymnasium where the men are exercised under skilled supervision and with marked benefit to their health.

"*Services inserted in the Estimates for 1878-9.*—Provide canteen in Royal Artillery Park Barracks.

"*Citadel.*—Provide officers' quarters and mess establishment, and improve lighting of officers' and soldiers' quarters.

"*Improved proposed Station Hospital.*—Provide coal shed.

"*Pavilion.*—Provide new court-martial rooms and new Royal Engineer Office.

"*Wellington Barracks.*—Provide workshop for regimental artificers, and build adult school and schoolmasters' quarters, build racket court and bread and meat store.

"*Glacis to Citadel.*—Construct drain."

*Bermuda.*

Deputy-Surgeon General Sinclair reports that "the general state of health of the troops serving in the Bermuda Command during the year 1877 has been very good."

There has been no epidemic disease amongst the troops or their families, with the exception of a few cases of scarlet fever among the children of the 87th Regiment at St. George's and Boaz. During the summer and autumn months twelve admissions with one death from enteric fever are recorded, attributable, in the opinion of the surgeon major in charge, to the close proximity of the

town of St. George's, the sanitary condition of which is very defective, typhoid fever being endemic there. *Foreign Stations.*

The following sanitary improvements have been effected during the past year.

*Prospect.*—Surface drainage of the camp near the stables improved; the floors of the latrines and urinals in the station hospital have been relaid with concrete, as also the latrines belonging to the married quarters; a reservoir tank for draining the officers' garden has been reconstructed.

*St. George's.*—New officers' quarters taken into occupation; a third block of new barracks occupied; new canteen occupied; new kitchen and new urinals and waterclosets to B and C blocks, new barracks; new bath room and wash-house for the men of the Army Service Corps; and one or two other minor improvements.

*Boaz.*—Improved ventilation in the married quarters, and a dry-earth closet; new latrines and urinals in the casemates, and a dry-earth closet in the commissariat yard.

*Ireland Island.*—The dry-earth system of conservancy introduced.

At *Prospect* a female hospital is much required; an estimate and plans for one have, however, been submitted, and the work will be put in hand as soon as the necessary sanction has been obtained.

In consequence of the completion of a third block of the new barracks at St. George's the number of men continually under canvas has been considerably reduced.

The station hospitals are in good working order and sufficient for the requirements of the sick, and the minor defects noted in the annual inspection reports are being remedied.

#### *West Indies.*

Deputy Surgeon-General Fasson remarks:—"With the exception of a short epidemic of yellow fever which occurred among the White Troops at Newcastle, Jamaica, towards the end of the year, and from which there were 10 deaths, the general health of the troops in the Command, both white and black, has been fairly satisfactory."

*Barracks.*—Excepting Belize and Corozal, British Honduras, and some huts at Newcastle, the barrack accommodation may be said to be generally good and sufficient, and the ventilation well cared for. The defective barrack at Corozal is being replaced by a new one on a more favourable site, and the huts at Newcastle have been recommended to be removed to a position higher up the cantonment.

*Hospitals.*—No change has occurred during the year in the buildings occupied. The station hospitals have afforded ample accommodation for the sick.

*Drainage.*—The drainage has been on the whole satisfactory. At Up Park Camp, Jamaica, improvements in the surface drainage, married quarters, and wash-house have been sanctioned, and will be shortly carried out.

*Clothing.*—The White Troops continue to wear the white drill frock, but the red serge frock provided for infantry by Clause 27, Army Circular, March 1877, is considered to be a great improvement over the white drill, protecting the wearer when perspiring freely after active exercise from the risk of chill, but Dr. Fasson draws attention to the colour, red, which he states becomes quickly stained and discoloured by excessive perspiration, and he suggests that blue would be much preferable.

Several minor sanitary improvements, such as the provision of cooking stoves, earth closets, bath and ablution rooms, &c. have been made during the year.

*Yellow Fever.*—Referring to the outbreak of yellow fever, it appears from a long and carefully written report of Deputy Surgeon-General Fasson's, that 10 cases of this disease, all of them fatal, occurred at Newcastle during the months of November and December. No case had been recorded at that station since the serious epidemic of 1867. The climatic conditions of the station had been somewhat unusual during the last quarter of the year, the ordinary rains in October did not occur, but heavy rain fell in the middle of November, and in December more or less up to the 18th of the month. The temperature of the quarter was considerably above the average, and the ozone

*Foreign Stations.*

was noted as remarkably low. Sporadic cases of yellow fever had been present in Kingston and the neighbouring plains since the beginning of the year, and in July a fatal case occurred at "Ellerslie," a detached residence occupied by a civilian, and situated below and in front of Newcastle; three other cases in this house followed in rapid succession. In August two cases were reported in a neighbouring villa, "Ropley," and it is noted that the occupants of these two houses had been in constant communication with each other. In October and November three other cases occurred in adjacent houses.

The first case amongst the troops appeared on the 12th November, and as will be seen on referring to the statistical report, between that date and the 23rd December eight other cases were admitted into hospital.

A fatal case at Kingston is also recorded in the month of November.

It had been decided by the Senior Medical Officer at Jamaica, Surgeon-Major Beath, who visited Newcastle after the occurrence of the first case, to recommend that the troops occupying the affected lines, should, in the event of a third case, be moved to the "Camp of Isolation," on Hope Farm, at the foot of the hills. This movement was carried out by Surgeon-Major Devlin on the 13th December, and subsequently, on further cases occurring, the whole of the main lines were vacated, and the men encamped on different spurs of the hill, chiefly to the eastward. This measure was eminently successful in stamping out the disease, only one case being admitted at the "Camp of Isolation" after the affected huts had been vacated; and that on the very day following the removal; it is fair, therefore, to presume that the disease in this case had been contracted in Newcastle prior to the march out. With regard to the origin of the disease Dr. Fasson is unable to speak very decidedly, but he inclines to the opinion that it was imported. On the appearance of yellow fever at "Ellerslie," "Ropley," and adjacent houses, the troops were confined to cantonments, and a sanitary cordon established between these affected localities and Newcastle; in spite of these precautions, however, it is believed that soldiers did communicate with the residents of these houses, and there is evidence that the wife of a sergeant who was first attacked with yellow fever had been employed as a nurse in one of them a short time before.

At the time of the outbreak the sanitary condition of the cantonment was exceptionally good, only one hut, and that situated beyond cantonment limits and occupied by a civilian, being reported as in an exceedingly foul state; its inmates, however, escaped scot free.

In concluding his report Dr. Fasson urges very strongly the necessity of speedily removing troops from any barrack, hut, or camp where yellow fever has localized itself; and he draws attention to the advisability of making "clearings" in the hills round and about Newcastle, equal to encamping the whole garrison, as he considers the "Camp of Isolation" at Hope Farm too small, and its situation too low down the hill.

The huts, barracks, &c. that had been occupied by cases of yellow fever were thoroughly disinfected and cleaned prior to re-occupation, and the men have enjoyed excellent health since their return from camp.

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*West Africa.*

Surgeon-Major A. Johnston, the Principal Medical Officer, reports:—

"The sanitary state of the station (Sierra Leone) has been good during the year. There has been no increased cubic accommodation in barracks or hospital, no alteration in the scale of rations or diets, and no change in the clothing of the troops. The drainage, which is entirely surface, is good."

Dr. Johnston calls attention to the proposed sanitarium at Leicester, which he strongly recommends; the site is 1,000 feet above sea level. It will consist of an encampment for 100 men, and a rifle range; the men will be accommodated in wooden huts. The water supply is good and ample from a mountain stream, and the situation is described as all that could be desired in a sanitary point of view, and he believes it will greatly conduce to the health of both officers and men serving at Sierra Leone.

There is no gymnasium at either of the West Africa stations.

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*Cape of Good Hope.*

Deputy Surgeon-General Woolfreys reports:—"The sanitary condition of the several garrisons has been satisfactory, and the general health of the troops has been good. No mention has been made by medical officers in their reports of any cause particularly affecting the health of the troops, and I know of none from my own observation and experience. In addition to the maintenance of water supply, and incidental repairs to barracks, hospitals, &c., the following sanitary improvements have been made by the Royal Engineers in the Command during the year. *Foreign Stations.*

"*Cape Town.*—Main Barracks.—The ventilation and drainage in the Staff Sergeants' Quarters have been improved; also 2 cast iron ash bins have been provided, and a lavatory for the men fitted up in C. block.

"*Hospital.*—A large plot of grass in front of the hospital, and adjacent to the sea beach, has been enclosed by posts and rails to form a recreation ground for convalescents and those allowed out of bed. It is a great boon, and much prized by the patients. A *Moule's* patent earth-closet has been fixed in hospital and in No. 6, sick officers' quarters.

"*King William's Town.*—New surface drains have been provided in the Station Hospital, and a new latrine for the guard of Provost Establishment.

"*East London.*—The canteen has been improved by increasing its height, and providing ventilation which was much required.

"*Natal, Fort Napier.*—A block of married soldiers' quarters has been erected, this was much needed. A pack and foul linen store have been provided for the hospital, and additional accommodation for 24 patients.

"*Ablution.*—Facilities for ablution are much required at the new stations in the Transvaal and Natal.

"*Soldiers' Diet.*—No alteration has been made, except at the new stations, where potatoes were at times scarce, and at King William's Town during the drought, when preserved vegetables were issued and a ration of lime juice.

"*Clothing.*—With the exception of the new helmet, which is a decided improvement, I do not consider the clothing as well suited to this climate as it might be: it is too hot for summer and too cold for winter, and the great coat is not waterproof.

"There is no gymnasium in South Africa. At Cape Town, King William's Town, there is the materiel out of doors provided by canteen funds, but it is rarely used by the men."

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*St. Helena.*

Surgeon-Major F. Gillespie, M.D., the senior medical officer at St. Helena, reports that "there has been nothing abnormal in the climatic conditions of the Island during the year. The troops have been remarkably free from serious or epidemic diseases, slight disorders of the respiratory or digestive systems, with venereal and trifling injuries, forming the bulk of admissions. The station has been in a good sanitary condition."

Attention is drawn to the bad quality of alcoholic drinks obtainable in the town as one chief predisposing cause of disease.

The effect of the climate is considered to deteriorate the health of Europeans in causing general relaxation and want of tone. Tropical or acute diseases of any kind are singularly absent, and the position of the Island and a strict quarantine are effectual in preventing the admission of contagious disease from ships touching there for water or supplies. Malaria is conspicuous by its absence, and on the whole the Island is stated to enjoy a high ratio of health considering its tropical situation.

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*Mauritius.*

Surgeon-Major H. Ferguson, the senior medical officer, reports: "The sanitary state of the garrisons in the Command during the year 1877 has been

*Foreign  
Stations.*

satisfactory, and the general health of the troops, considering that malarious fever is endemic in the Island, has been fair.

"There have been no causes of disease particularly reported by any of the medical officers. The prevailing diseases have been ague and venereal. The Contagious Diseases Act is not in force in the Command.

"The only sanitary improvement carried out during the year was the formation of a drain to carry off the dirty water from the cookhouse at Fort Adelaide.

"The clothing of the troops is good and well suited to the climate.

"There has been no change in the scale of the soldiers' diet, the present being satisfactory.

"The condition of the drainage in the vicinities of the camps, barracks, and hospital is fair."

*Ceylon.*

Surgeon-Major T. J. Murphy, the senior medical officer in Ceylon, remarks that "the sanitary reports from the different stations have generally been favourable, but the medical officer at Galle has reported, in connexion with the occurrence of enteric fever at that station, defective drainage of the hut encampment outside the fort.

"Cooking ranges are required in barracks and hospital at Galle. I think that some attempt might be made to vary and improve the rations of the troops, as, at present, the men have very inferior beef served out every day without variety. I have recommended the issue of salt pork and peas on one day in each week. I think that English potatoes might, with great advantage, be given to the men every day instead of only two days a week, as at present.

"A new barrack has been completed at Colombo; it accommodates eight non-commissioned officers and 224 rank and file.

"Permanent carpenters' and smiths' shops have been handed over for use during the past year (1877). Facilities for ablution have been increased by the addition of eight baths.

"A change of clothing was contemplated for the troops, but, on the representation of the Lieut.-General Commanding, a continuation of white clothing has been sanctioned.

"There are no gymnasia in the Command. I do not think it desirable that the men should practise gymnastic exercises in the hot debilitating climate of Colombo, Galle, or Trincomalee, but I agree with the medical officer at Kandy in thinking that, at that station, a gymnasium would be likely to conduce to the health and vigour of the men."

*China and Straits Settlements.*

Deputy Surgeon-General R. Gilborne reports:—"The health of the troops at Hong Kong was not nearly so good last year as during 1876, owing chiefly, to the great heat and length of the summer season, which was protracted until November. The rainfall was greater than that of 1876, but it did not extend over so long a period, and consequently, the influence on the temperature was less.

"The health of the civil population also suffered, and the Colony generally was not so healthy as in the previous year. The health of the troops serving in the Straits Settlements may be considered as having been very fair. The remaining stations in the Malay Peninsula, Qualla Kangsa, Banda Bâhrû, and Sunghie Ujong, were given up during the early part of the year, and thus many of the pre-disposing causes of sickness (residence in the jungle, swampy districts, &c.) were avoided.

"The following improvements and additions to the sanitary arrangements in the Command have been made:—

"*Hong Kong*.—Commissariat buildings. Leading the drain from the cookhouse to low water. Ventilating the recreation room, waterclosets, and boatmen's quarters.

*"Murray Barracks.*—Providing cover from the sun and rain at the latrines, *Foreign Stations.* leading a constant stream of water through the latrines and main sewer, leading a stream of water to the mouth of the out fall sewer; providing additional supply of water to officers' baths and waterclosets; draining off the water from a swamp in the vicinity.

*"Kowloon.*—A marked change in the sanitary condition of Kowloon for the past year has to be reported. It is customary for the infantry regiments in garrison at Hong Kong to proceed by companies to the promontory every year during the cool season for musketry practice, being encamped in the ordinary circular bell tents. In previous years the men benefited in health considerably by the change, but soon after the course commenced last season malarious fevers of a severe type broke out amongst the men. After careful inspection of the vicinity of the camp it was found that the diseases were caused by the disturbance of the soil by civilians who owned and cultivated plots of land around the military reservation. On inquiry it was ascertained that the civilian families residing at Kowloon suffered to a great extent from these fevers; and that some of their native servants had died from the same causes. Therefore recommended to the officer commanding the troops that the men should be withdrawn and the musketry course suspended. This measure was adopted, and the fevers declined in number after the return of the men into garrison. Many of the diseases, however, which had doubtlessly been contracted at Kowloon, developed themselves many days after the men had been withdrawn from the main land.

"The past hot season at Hong Kong was very prolonged and unhealthy, and the health of the men of the 28th Regiment had become considerably depreciated by climatic fevers. Upon my representing that it would be highly desirable if the regiment could be removed before the next hot season, it was decided that an exchange of stations between the 74th Regiment in the Straits (which has hitherto enjoyed good health), and the 28th would meet the necessity of the case, and the exchange was carried out accordingly.

"Since then the health of the men of the 28th Regiment has decidedly improved.

*"Victoria Barracks.*—Providing children's latrine.

*"North Barracks.*—Providing bath in women's ablution room.

*"McGregor's Barracks.*—Introducing dry earth system of conservancy.

*"Hospital Ship 'Meeanee.'*—Ventilating orlop deck and hold; isolating orlop deck and hold from the wards; isolating waterclosets and urinals from the wards; fixing jalousies to the posts.

"No works of importance have been carried out in the Straits Settlements, with the exception of the erection of a dead-house at Panang, which was much needed.

"A new hospital was taken over from the Colonial Government at Malacca, on the 10th February 1878, for the use of the troops.

"The ventilation of all the barracks in the Command is reported to be very satisfactory, and the cubic space and superficial area sufficient.

*"Warming and Lighting.*—The means of warming the barracks at Hong Kong are ample. The lighting has been improved by the introduction of large kerosene lamps, which render the appearance of the barracks rooms far more cheerful than formerly.

*"Water.*—The water supply has been good and abundant at all places.

*"Clothing.*—The clothing has been in all respects suitable to climate and season.

*"Hospital Establishment.*—I would draw special attention to the subject of conveyance of serious cases of illness from the shore to the hospital ship in open pulling boats, and repeat my former recommendation that a covered steam launch should be allowed for the service.

"Means for warming the hospital ship in the cold season are much required. In my last report it was recommended that two large stoves with wide flues should be placed on each deck, such an addition would add materially to the comfort of the patients."



*Bengal.*

## INDIA.

## SANITARY REPORT FOR 1876.\*

*Bengal.*

Surgeon-General Ker Innes, C.B., remarks :—

"The sanitary history of the year 1876 has happily been an uneventful one, and the favourable conditions which have rendered it so, are, without question, largely due to the assiduous attention which sanitary science has received at the hands of Government.

"The hygienic condition of some of our stations leaves little to be desired, but there are others which are capable of vast improvement in drainage, in water supply, and in the accommodation appropriated to the troops. Under the first of these heads Barrackpore and Dum Dum are notable instances, whilst there is a third category in which may be placed stations like Meean Meer, Amritsar, &c., which it would seem can only be rendered fit for the cantonment of European troops by an expenditure so large as even to suggest the question whether the present sites themselves should be adhered to.

"The military stations at which sanitary inspections have been made since the second quarter of the year, during which the Surgeon-General assumed administrative charge of the command, have included the majority of those between Peshawar and Calcutta, inclusive of Jubbulpore in Central India, and Lucknow and Fyzabad in Oudh. The results of these are incorporated in the remarks which follow under the several divisions and districts.

"*Presidency District.*—The mortality of the year in this district shows some increase over that which preceded it, due to the occurrence of three deaths from cholera at Calcutta, and three from enteric fever at Barrackpore, neither of which diseases figure in the returns of 1875.

"At Fort William the healthy appearance of the 2/12th Regiment contrasted favourably with that of the 40th Regiment cantoned at Dum Dum, and especially with the detachment of that corps at Barrackpore. The anæmic and fever-poisoned appearance of the troops at each of these last-named stations was sadly apparent.

"The defective drainage of Barrackpore, where the water is within 6 or 7 feet of the surface, coupled with the inferior barrack accommodation accorded to the infantry detachment, sensibly augments the amount of preventable disease. The potable water supply is, however, under recent arrangements, excellent.

"At Dum Dum, on the other hand, the whole supply of drinking water is derived from tanks, a circumstance which cannot but largely favour the spread of all forms of epidemic disease. At this station the size of the barrack windows seemed wholly insufficient for the due ventilation of the rooms, and my representation to this effect was, I believe, at once responded to by the Engineer Department. The walls of the hospital enclosure were also needlessly high, these have since been lowered.

"At Darjeeling the old barracks are very gradually being replaced by more suitable structures. It is much to be regretted that the funds available for this necessary purpose are so scantily supplied.

"At Hazaribagh the detachment of the 109th Regiment has been very healthy, no enteric fever having shown itself since 1874.

"*Allahabad Division.*—As was also the case in the preceding year, cholera showed itself in the division, and 17 deaths out of 29 attacked resulted. To enteric fever is also attributable three casualties. With this exception the health of the troops has been good; the death rate, raised by the causes above noticed, has amounted to 57.

"*Benares.*—The health of Benares seems to have improved much since the preceding year. There are no very patent sanitary defects in the quarters allotted to the troops; all have ample room, and although the character of the buildings leaves much to be desired, much of the present immunity from disease is traceable to their ample segregation. The lavatories at this station are complained of, and there is great deficiency of subsidiary hospital buildings.

\* The above Report was received too late for publication in the volume for 1877, and the Report for 1877 has not been received up to the time of going to press.

*"Dinapore.*—There has been a disproportionate amount of sickness amongst *Bengal.* the old German soldiers belonging to the 109th Regiment at Dinapore; ague and hepatic affections having become very common. The general condition of the barrack accommodation at this station is lamentably defective.

*"Pachmarhi.*—The advantages of Pachmarhi as a military station continue to be dwelt on. It is a source of regret that, in the absence of any regular hospital, the sick have to be treated in one of the very excellent barrack buildings, thus curtailing the accommodation which else would be available for healthy troops. I fully concur with Surgeon-Major Thompson as to the desirability of cantoning a larger number of troops at this station, so soon as it is placed in more direct relation to our railway system; at present selected men only are sent. There can be no question that the more healthful discipline afforded by a regiment would yield more favourable results than under present circumstances even is found to be the case.

*"Lucknow Division and Rohilcund District.*—In this division a visitation of cholera in the autumn of the past year has raised the number of deaths to 115, or 15·47 per 1,000.

*"Fyzabad.*—A very high rate of sickness has also obtained in the 1/25th regiment at Fyzabad; a corps largely made up of young recruits, and in which there were not only 10 casualties from enteric fever, but 1,510 admissions to hospital from other causes, while no less than 31 young men are said to have broken down under training and had to be invalided to England.

A new female hospital has been erected at Fyzabad in close proximity to the regimental hospital of the 1/25th. Its position renders it ill-adapted for the use of women, but it will form a valuable addition to the accommodation of the last-named building when this becomes common to both infantry and artillery, the hospital now appropriated to the Royal Artillery becoming the station female hospital.

The extension of the barrack accommodation at Naini Tal is very strongly urged by the Administrative Medical Officer. The sanitarium is one of proved utility, readily accessible, and forming a valuable link between the stations in the plains of Rohilcund and Ranhikhet, and Chakráta to the North.

*"Gwalior District.*—The past year compares favourably with the preceding one in its general sanitary condition, the proportion of deaths to strength having ranged at 8·11 per 1,000. Three out of the 20 deaths are attributable to suicide, and five to enteric fever, of which there were 11 cases, five of them happening at Morar and fortress Gwalior, the remainder scattered throughout the district.

*"Morar.*—The great need of a station hospital for Morar is urgently pressed, the present accommodation afforded to the sick being not only bad, but wholly inadequate. The same remark applies with nearly equal force to Nowgong and to Saugor. The drainage of the last-named station appears very capable of improvement, and a case of enteric fever which appeared there is attributed by the medical officer to the condition of a drain which runs past the married quarters. But little has been done of late years to improve the barrack accommodation of these stations; in nearly all of them those improvements are absent which have elsewhere contributed so largely to the health and well-being of the European force in India.

*"Meerut Division.*—On the whole the past year has been a very healthy one. Malarial fevers have been prevalent chiefly at Delhi, and there were seven widely scattered cases of enteric fever. Very extensive drainage works are being carried on, but the time has not yet arrived to judge of their effects on the sanitary statistics of the district.

*"Meerut.*—One of the most patent requirements at Meerut is the erection of subsidiary quarters in connexion with the new hospital. Were this effected it would be practicable to give over the buildings at present used for the sick of the infantry for the occupation of troops who much need additional accommodation. The barracks in the European cavalry lines have lately undergone very great improvement.

*"Delhi.*—At Delhi the condition of the buildings appropriated to the troops is described as excellent.

*"Agra.*—At Agra there is very urgent need of hospital accommodation. Were this supplied, the sick of the infantry and artillery might be treated under the same roof with economy and advantage.

*Bengal.*

**Muttra.**—At Muttra the accommodation afforded to the troops leaves much to be desired, but the general health of the men has, on the whole, been favourable.

**Roorkee.**—The situation of Roorkee as a quarter for European troops is highly advantageous in its sanitary aspects, but its defective drainage renders it needlessly subject to intermittent fever, the admissions from which have averaged, in the infantry, 482 per 1,000. A number of wet malodorous ditches, with insufficient fall for their proper discharge, are the recipients of the barrack overflow; a want of funds has hitherto prevented the representations which have already been made to this effect from being responded to.

**Chakrata.**—The reports from Chakrata are in all respects most favourable. The original huts erected by the 55th Regiment are being very slowly replaced by substantial single storied buildings as funds become available, and an improved water supply is in contemplation:

**Landour.**—Landour as a sanitarium is, as usual, favourably reported on, and it is to be regretted that additional barrack accommodation does not render the advantages which it offers more fully available.

**Sirhind Division.**—With the exception of the remarkable prevalence of malarial fevers amongst the troops at Jullundur during the late autumn, the sanitary history of the Sirhind Circle for 1876 presents nothing worthy of special observation.

There was a very unusual rise in the Sutlej and Ravee rivers, owing to which a wide submergence of the district and a corresponding rise in the level of the surface water took place. The native town of Jullundur itself was almost depopulated by fever, and the same disease became rife amongst the European troops of the cantonment, which occupies a somewhat higher level.

**Umballa.**—The Deputy Surgeon-General of the Circle dwells with much emphasis on the depressing effects of over-crowding amongst troops, and of the tendency to phthisical and other allied diseases to which they are in this manner rendered liable, his remarks having special reference to the occupation of verandah space in the Umballa barracks, and to the relief which was effected by the relegation of a detachment to Solon. The necessity of more effectual subsoil drainage is represented, and improvement anticipated from the water supply which has recently been laid on.

**Dagshai.**—At Dagshai the ventilation and lighting of the barracks has been much improved, but the hospital accommodation for men is inconveniently scanty. Much sickness usually prevails amongst weakly troops from the plains during the first year of residence, which renders this a very urgent want.

**Subáthu.**—At Subáthu the old barracks remain in a very insanitary condition, and in reference to these Deputy Surgeon-General Crawford remarks, that nothing short of reconstruction on other localities will meet the requirements of the troops. It seems so desirable to extend the location of Europeans in the mountains, that the erection of additional barracks on the ridge above the present site of the cantonment, commends itself as far preferable to the creation of increased barrack space at Umballa.

**Lahore Division.**—The average admission rate per 1,000 men was 1934 and of deaths 14.54.

**Meean Meer.**—In Meean Meer deep drainage has been attempted, but so recently that as yet the results cannot be gauged. Malarial fevers of a very adynamic type have been extensively prevalent.

**Amritsar.**—At Fort Govindgarh attempts have been made to reduce the amount of malarial fever by deepening and draining the fort ditch, but from the dilatory manner in which the work has been pursued there is no question that the evil has been aggravated rather than lessened. The subsoil water is always within 10 feet of the surface, and the broken appearance of the men of the detachment at Amritsar, which supplements the garrison of the fort, affords evidence of its ill effects.

**Sialkot.**—Sialkot, with a better system of deep drainage, should enjoy an excellent climate. Of late years, however, the level of the subsoil water has risen considerably, owing, it is said, to the destruction or state of unrepair of an extensive bund which fenced it from the river. At this station there occurred six cases of cholera during the prevalence of that disease in the district, the north-western side of the cantonment, that in which the drainage is most defective, has suffered to a disproportionate degree.

"*Rawal Pindi Division and Peshawar District.*—In this district the average *Bengal.* admissions per 1,000 men have amounted to 1585·4, and of deaths 23·96; but even these excessive rates compare favourably with those of 1875. Cholera is largely accountable for this mortality; in the B/F. Royal Horse Artillery at Peshawar 13 out of the 15 deaths were due to it.

"In the 11 separate bodies of troops, including Murree Depot, in which cholera appeared, the attacks per 1,000 of strength varied from 3·45 in 1/17th Regiment at Kuldunnah to, 112·67 in the above-named battery.

*Peshawar.*—The actual mortality from all causes in the several corps appears to have been largely influenced by their previous sanitary condition, thus the 70th Regiment, who had been recently quartered at Peshawar during its most malarial season, suffered to a much greater degree than the 1/8th and 51st Regiments who were encamped in that district and removed to a distance from its immediate influence. Deputy Surgeon-General Smith remarks, that the practical results of this measure, rendered imperative by the presence of cholera in cantonments, are highly suggestive of the good effects that may be anticipated by a similar move from the station during the months of September and October, irrespective of the appearance of cholera and in anticipation of the outbreak of the autumnal fevers.

"The chief defects of the barracks at Peshawar consist in their slight elevation from the surrounding level, their uncontrolled ridge ventilation making them cold and draughty in winter; their insufficient supply of window light; in the friable material of which the flooring is made; in the great need of properly constructed surface drains; and in the deficient accommodation for married families.

"*Nowshera.*—At Nowshera there is the same absence of surface drainage which obtains at Peshawar, and no gymnasia, reading or recreation rooms exist; but in spite of these drawbacks, Nowshera offers a pleasing contrast to the fever-stricken area which Peshawar occupies.

"The following points are especially noted as requiring amendment:—

"(1.) The provision of a new guard-room, the present one being too small, ill-placed, and badly ventilated.

"(2.) Reflooring verandahs, &c.

"(3.) The planting of additional trees.

"(4.) The supply of trestle cots to replace the charpoys now in use.

"At Rawal Pindi the barrack accommodation is especially good, and such sanitary recommendations as have from time to time been made have already received attention. Nevertheless there are minor points still requiring remedy, such, for instance, as the insufficient privy accommodation of the European Cavalry lines, and more effectual control over the ridge ventilation. A well should be dug in the hospital compound of the same lines; at present all water is brought from a distance, a source of inconvenience in the hot weather.

"The barracks at Clifden, some 700 feet below Murree, and a mile and a quarter distant from it, were originally intended to accommodate 96 families; but much sickness resulted as a consequence of overcrowding, and the number was reduced to 56 with excellent results. These barracks altogether escaped cholera whilst it raged at Murree during the past hot season. The same overcrowding which was accountable for much of the sickness that first occurred at Clifden, has still periodically exercised an unfavourable effect on Murree itself and on some of the neighbouring mountain posts; but the general result of the establishment of these stations has been so encouraging as to render their extension a question of vital moment when considered with reference to the well-being of our European force in India.

"The remarks contained in Dr. Fuller's report with reference to Cherat have my entire concurrence. He says:—"I cannot speak too strongly of the beneficial effects obtained from the occupation of this station during the past season. The sickly men sent from Peshawar and Nowshera have all, with the exception of those suffering from organic diseases or climatic cachexia, recovered; and the recruits of the season, some 200 in number, have not only enjoyed good health during their first year in India, but have improved immensely in their general condition.

"Cherat during the past year has enjoyed a perfect immunity from sun-stroke, cholera, and malarial fevers, diseases which have caused such serious mortality and sickness amongst the troops serving in the valley. This fact speaks for itself, and requires no comment from me.

*Bengal.*

"The enteric fever, that occurred during the early months has, I think, been satisfactorily proved to have been caused by the contamination of one of the sources of the water supply. Measures to prevent the possibility of such an accident occurring again ought to be taken with as little delay as possible after the troops leave this in December, and the water supply in future ought to be placed under immediate European supervision.

"The system of accommodating the great majority of the troops and the whole of the families in tents is attended, in the very hot and very cold weather, with much discomfort to both, and is accountable for the simple febrile attacks and the diarrhoea that have occurred, and it is on this account solely, I believe, that the station is so unpopular with them. Suitable huts, constructed of mud and stone, with slate slab flooring, fitted with fireplaces, should be built upon the crests of the different hills. At the present time only six of these huts exist, which are without either fireplaces or flooring, and two of them are situated in a basin."

"At Attock, Dera Ismail Khan, and other stations within the valley of the Upper Indus, scorbutic disease has shown itself from time to time in so pronounced a form that daily rations of lime juice have been found necessary, and in the first named of these stations an extra amount of vegetable ration has been sanctioned."

## SANITARY REPORT FOR 1877.

*Madras.**Madras.*

Surgeon-General C. A. Gordon, C.B., reports that the health of the British troops during 1877 has been on the whole favourable, the ratios of daily sick, admissions, deaths, and invaliding showing only a slight increase as compared with the previous year.

Famine prevailed extensively among the native community throughout the Presidency, and cholera and small-pox were rife among the same class, 357,430 deaths being ascribed to the former and 88,321 to the latter disease.

The death-rate, 17·07 per mille of strength, exceeds that of 1876 by 1·44; the admission rate is greater, the daily sick-rate slightly in excess, while the numbers invalided amounted to 46·27 per mille of strength against 42·94 in the previous year. Cholera caused 35 admissions and 19 deaths among men. One officer died from this disease.

The cases were distributed pretty equally throughout the Command.

Enteric fever, so called, caused 65 cases and 22 deaths among men, the admission ratio (5·90) exceeding that of 1876 by 1·32 per mille of strength. The distribution of these cases is shown in the following Table:—

TABLE showing the DISTRIBUTION OF ENTERIC FEVER in the COMMAND.

Corps.	Admissions.	Deaths.	Station.
44th Regiment - - -	15	4	Secunderabad.
Depôt - - - - -	11	3	Wellington.
2/16th Regiment - - -	10	4	Secunderabad.
Royal Artillery - - -	8	1	Secunderabad.
14th Hussars - - - -	7	3	Bangalore.
Royal Artillery - - -	5	4	Bangalore.
43rd Regiment - - - -	2	—	Bellary.
Royal Artillery - - -	1	1	Bellary.
Royal Artillery - - -	1	1	Saint Thomas' Mount.
Detachment, 48th Regiment - -	1	—	Malleapooram.
33rd Regiment - - - -	1	—	Kamptee.
1/21st Fusiliers - - -	1	—	Rangoon.
Royal Artillery - - -	1	—	Thayetmyo.
Depôt - - - - -	1	1	Poonamallee.
Total - - - - -	65	22	

Small-pox caused five admissions, none fatal, against one in previous year. Cases of sunstroke were less frequent as compared with 1876, the admission ratio, 1·72 per mille of strength being less by 2·14. The death ratio, 1·8, shows a reduction of ·43 per mille of strength; one death occurred out of hospital.

The sanitary condition of barracks, hospital accommodation, water supply, drainage, conservancy, and other details connected with the health of the troops will be considered according to circles, and to the report on each circle will be appended a statement of improvements which have been effected during the year as well as one of those proposed but not yet carried out.

*Climate.*—PRESIDENCY CIRCLE.—The year 1877 has been a trying one. In Madras there was a complete absence of rain during the first four months of the year, but about the middle of May the station was visited by a cyclone which lasted three days and was accompanied by a very heavy rainfall, 22 inches being registered. The south-west monsoon was late in its appearance, irregular and scant in its rain supply. This, however, was compensated for by the copious rainfall afforded by the north-east monsoon during October and November. The water supply was at all times sufficient for the requirements of the troops. The mean temperature for the year was 81·8, and the total rainfall 66·20 inches, the latter exceeding that of 1876 by 44·60 inches.

At Trichinopoly, the heat was very great throughout the year, and but little rain fell until October. Notwithstanding the excessive heat, no case of sun-stroke occurred, while in the previous year four cases of that affection were recorded. At Bellary the hot season commenced early, and great drought prevailed up to the middle of July. The annual rainfall, 26·513 inches, was considerably above the average (17 inches), and to its excess was attributed the prevalence of malarious disease among the troops and their families in the latter months of the year. The prevalence of famine among the native population affected the health of the troops injuriously at nearly all stations, the influx of natives for employment on relief works increasing clandestine prostitution considerably and causing much venereal disease among the soldiers.

*Barracks.*—Fort Saint George.—These have undergone no change during the year. The force occupying them comprised the head-quarters 67th Regiment and a detachment of Royal Artillery.

*Hospital Accommodation.*—The same buildings were in occupation as in last year. That at Fort Saint George meets fairly well the requirements of the troops, its worst features being its close proximity to the river and native town.

At Poonamallee, the new hospital commenced on 4th September 1876 is not yet ready for occupation. At Trichinopoly several improvements have been effected, light and ventilation have been increased thereby, so also has the cubic space per patient. A new hospital for the treatment of contagious diseases in course of construction and will shortly be completed. At Bellary two ranges of quarters for the hospital native servants were completed on 5th April, but owing to the absence of latrine accommodation they have not yet been occupied. A ward for the isolation of cases of infectious diseases is much required, and it is contemplated to utilize the purveyor's store for this purpose.

*Water Supply.*—No change has occurred in the source, and the supply was adequate for all purposes. The wells are protected, and the potable water is carefully filtered prior to use. Macnamara filters, as well as those of the ordinary three-chatty pattern, being in use.

At Saint Thomas' Mount, a special filter, devised by Surgeon-Major Nicholson, has been in use, and is stated to have answered well. At Ramandroog the neighbourhood of the wells has been paved, thereby lessening risk of pollution.

*Drainage.*—At Fort Saint George, the drains are simply open stone channels intended solely for the removal of surface water. In a few places they are covered and trapped. They have been carefully supervised and have occasioned no inconvenience. At Pallaveram, the ground in the neighbourhood of No. 3 block becomes swampy during the rains, but the health of the troops did not suffer therefrom. This sanitary defect has been represented. At Bellary the surface drainage is not satisfactory, but steps are being taken to improve it. Elsewhere the drainage arrangements have been good.

*Conservancy.*—At all stations the dry-earth system is in use both in barracks and hospital. At Poonamallee sand is used instead of earth, the latter being difficult to procure. At Trichinopoly Roger's self-acting system is provided for the Infantry barracks only, in the R.A. barracks the earth is applied by hand. At Ramandroog iron receptacles of proper form and construction have been substituted for the earthen chatties formerly employed for the purpose of conveying the excreta to the filth pits.

*Cooking of Barracks.*—This is effected by Punkahs and Kus-Kus tatties.

*Lighting.*—The barracks at Fort Saint George are lit with gas. Elsewhere, up to the end of 1877, oil was in use both in barracks and hospitals. During

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the present year (1878) kerosine oil lamps have been supplied to several of the hospitals, and are very favourably reported upon.

**Ablution and Bathing Accommodation.**—Ample means are provided everywhere for ablutionary purposes, and plunge-baths exist at all stations, Ramandroog excepted. In the new barracks at Saint Thomas' Mount the ablution rooms are fitted up on the most approved system with force-pumps, tank, &c. The pumps, however, are stated to work badly, and the tubs are filled by hand. The supply of water was sufficient. No bathing parades were held at Fort Saint George, the high surf and danger from sharks precluding it.

**Rations.**—Owing to a better supply of fodder for cattle being procurable the meat ration improved. The rations underwent no change in quantity.

**Canteens and Liquors.**—The buildings in use met fairly well all requirements. At Bellary a new canteen is in course of construction. The supplies issued by Government were of good quality and comprised ale, porter, and rum, the latter being manufactured from sugar at Aska in the Ganjam District. At most stations additional articles were procurable when required. The canteen rules have undergone revision, and are now as follows:—

1. The canteen will remain open from a convenient hour in the morning, as commanding officers of corps may determine, till tattoo, during which time the soldier may obtain malt liquor in such quantities as may be convenient to himself (duty permitting and he being sober) on cash payment at the rate of 4 annas per quart.
2. No man can receive more than one dram of rum per diem, which can only be procured in half drams, one between morning and noon and the other between noon and tattoo, the price being increased to 2 annas per dram or 1 anna per half dram.
3. Arrangements are to be made to enable men to receive malt liquor in small quantities of a glass or half-a-pint and to dilute their half dram of rum before drinking it.
4. No liquor is to be carried out beyond canteen limits, except with the approval of the commanding officer. The occasions when liquor may be taken from the canteen are limited to those specified in para. 92, section X., Canteen Regulations.
5. The present system of enforcing the drinking of liquor at the bar is to be discouraged as far as possible.
6. The increase in the price of rum is not required to be paid to Government, the extra retail charge at 1 anna per dram to the soldier being available for credit to the canteen fund.

**Vaccination.**—Effectively carried out at all stations and with good results. Revaccination was practised when necessary. The entire portion of the 67th Regiment quartered in Fort Saint George was revaccinated during the year. Although small-pox was prevalent among the civil population there were but three cases in this circle.

**Improvements.**—Bellary.—A new canteen for the Infantry in course of construction.

Trichinopoly.—Walls of hospital raised and new roof put on. Comfort and ventilation materially increased thereby. Floors of female hospital ward and of hospital bath-rooms asphalted. Hospital latrines re-roofed.

Ramandroog.—Back verandahs of barrack rooms fitted with fire-places. Small iron air-tight receptacles substituted for earthen chatties for removal of excreta from the latrines. Neighbourhood of the well paved. Drainage in connexion with the ablution rooms improved. Ventilation improved in cells and lock-up rooms.

**Improvements recommended.**—Fort Saint George.—Increased ventilation of lock-up rooms.

Saint Thomas' Mount.—That provision be made for removing the liquid and solid excreta from barracks and hospital in separate receptacles instead of in one box cart as at present.

Palaveram.—Improvement of surface drainage in the vicinity of No. 3 barrack room.

Bellary.—Improvement of surface drainage of Royal Artillery barracks. Isolation wards for hospital. A new military prison.

Ramandroog.—Increased ventilation in lock-up rooms and cells. Prolongation of surface drains from hospital wash-house. Provision for drainage of refuse water from married soldiers' quarters. Erection of a water cistern for storage of water.

*Climate.*—**MYSORE CIRCLE.**—At Bangalore the heat was great in the earlier *Madras* months of the year and the rainfall scanty. Slight showers fell throughout May, June, and July. The rainfall in September and October was considerable, being 12·73 in the former and 9·90 in the latter month. The total rainfall equalled 39·25 inches. At Cannanore the hot season lasted from March to the end of May. These months were among the healthiest of the year. The total rainfall equalled 125 inches. At Wellington the rainfall, 65·88 inches, was above the average yearly amount, and exceeded that of previous year by 34·18 inches.

*Barracks.*—These remained as in previous year, with one exception, viz., the completion of a new wing of barracks at Wellington. All barracks in this circle are single-storied, those at Wellington excepted. The accommodation afforded by all has been suitable.

*Hospitals.*—There has been no change in the buildings occupied. The hospitals at Bangalore, that of the infantry excepted, are excellent in all respects. The latter, although condemned, has answered its purpose well. Additional hospital accommodation is necessary for women and children at Wellington, and is under consideration.

*Conservancy.*—The dry-earth system was in use at all stations both in barracks and hospitals. The excreta is carefully removed to a distance from barracks and buried, except in the case of Calicut, where it is thrown into the sea. At Cannanore the floors of the hospital latrines were asphalted during the year.

*Lighting and Warming.*—Lighting is everywhere effected by oil, suitable lamps not yet being available. (Since May 1878, a few kerosine lamps have been issued to hospitals, and are highly spoken of.) It is expected that very shortly both barracks and hospitals will be lighted with kerosine oil.

*Baths and Lavatories.*—The ablution arrangements were satisfactory at all stations. All possess plunge baths, Calicut and Malliapooram excepted.

*Amusements.*—Gymnastic appliances are provided at all stations, and their use has been attended with benefit. The 14th Hussars, Bangalore, and the 48th Regiment, Cannanore, both possess good gymnasia, the former being under the care of the fencing master, the latter under a sergeant instructor. Much benefit is stated to have accrued from the exercises pursued.

At Bangalore the taste for athletic exercises is fostered by the establishment of a station athletic club. In addition, the ordinary means of out-door and in-door recreation are provided, the recreation rooms being well supplied with games, books, newspapers, &c.

Gardening is much practised at Wellington. The occupation is profitable as well as recreative, the Commissariat Department purchasing the vegetables for issue to the troops. Elsewhere gardening has been but little practised, and in the few instances in which it has been tried the results have not been satisfactory.

*Improvements.*—**Bangalore.**—New cooking range provided for Royal Horse Artillery cookhouse.

**Wellington.**—Staircase leading to upper storeys of married quarters roofed with zinc, and swinging windows placed at the landings, affording protection from rain and increasing light and ventilation. Door of canteen widened. Iron pipes substituted for the masonry ones formerly used to conduct drinking water to the reservoir. A masonry reservoir substituted for the half cask formerly in use. It holds about four days supply, and is fitted with taps. An ornamental lake is in process of formation at the south-west end of barracks, with a view to inundating the swampy ground and lessening malarial emanations. A dangerous bank near hospital protected by the planting of trees. Open masonry drains constructed to carry off waste water from the female hospital bath and ablution rooms.

**Cannanore.**—A new guard room nearly completed for the Infantry. Hospital drains cemented. Asphalt substituted for earth in floor of hospital, latrines, and ablution rooms. Trees planted around barracks.

**Calicut.**—A piece of ground in front of the hospital enclosed and laid out as an ornamental garden.

*Improvements proposed.*—**Bangalore.**—A new school room for Royal Artillery, the accommodation in the present one being reported insufficient. Further drainage of Artillery barracks. Additional taps for the Royal Artillery ablution and bath rooms. Substitution of air-tight receptacles for the wooden barrels at present employed for the removal of urine from the Royal Artillery



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quarters. Alterations in the Infantry urinals with a view to protection from rain and increase of ventilation. Quarters for the apothecary attached to the female hospital.

Wellington.—Improvements in ventilation of married quarters. Cook houses with small stoves or ranges for married people. A new female hospital, the present accommodation being insufficient. The erection of washing, drying, and ironing rooms.

Cannanore.—Substitution of asphalt for earth in floors of barrack latrines and ablution rooms. Additional accommodation for court-martial prisoners.

*Climate.*—HYDERABAD CIRCLE.—At Secunderabad the past year is described as having been exceptionally hot, and but little rain accompanied the advent of the south-west monsoon. The months of June, July, and August were fairly cool as compared with the three months immediately preceding. Heavy rain fell towards the end of August, and continued to do so at varying intervals during September. The north-east monsoon set in in October accompanied by heavy showers. The mean annual temperature for the year was 81° 8, and the total rainfall, 30° 90 inches, was double that of 1876.

*Barracks.*—At Secunderabad the same buildings were occupied as in previous year. The accommodation afforded thereby was suitable.

*Hospitals.*—At all stations in this circle the same buildings were in use as in previous year. A new hospital was constructed for the cavalry at north Trimulgherry, Secunderabad, but owing to the non-completion of the subsidiary buildings it was not occupied until 21st February 1878. The ventilation of the Infantry hospital has been improved, and further alterations in the same direction are to be carried out. During the year the Royal Artillery at Secunderabad were provided with a detached hut for the isolation of cases of infectious disease.

*Conservancy.*—With the exception of the Royal Artillery and barracks of 2/16th Regiment, Secunderabad, the dry-earth system, in a modified form, is carried out in barracks and hospitals at all stations in this circle.

*Lighting.*—Up to the end of 1877 oil alone was used both in barracks and hospital; since May 1878, kerosine oil lamps have been introduced into all hospitals at Secunderabad, and are highly spoken of. It is expected that ere long kerosine oil will be generally introduced both in barracks and hospitals.

*Improvements.*—Secunderabad.—A new-made hospital, completed. (This building was taken into occupation on 21st February 1878.) A new range of family quarters completed. A subsidiary block of quarters for the regimental band in course of construction. A small hospital for reception of infectious cases completed. A set of staff serjeant's quarters, with attached offices, completed. In addition to the above, several minor improvements in connexion with guard, beds in cells, and prisoners' rooms, alteration of urinals, and increased ventilation of infantry hospital have been carried out.

Kamptee.—A block of Infantry barracks remodelled, a similar process commenced on one of the Royal Artillery quarters towards the close of the year. Swampy ground to the south and west of the cantonment partially drained.

*Improvements recommended.*—Secunderabad. —To enlarge and deepen the tanks in the vicinity of barracks of 2/16th Regiment. To diminish the area of wet cultivation in the neighbourhood of same barracks.

Kamptee.—The erection of a new guard room for the Infantry on the standard plan. The construction of a range of family quarters.

*Climate.*—BRITISH BURMAH CIRCLE.—At Rangoon the first quarter of the year is stated to have been pleasant, the quarter succeeding excessively hot. The rainy season commenced in May, 33 days later than usual, the total rainfall amounting to 102 inches, and exceeding that of 1876 by 5 inches. At Thayetmyo the rains set in at the latter end of May and terminated in October, the total fall for the year being 63 inches.

*Barracks.*—Except at Rangoon, where two new bungalows have been constructed for the Infantry, the accommodation for the troops remains unchanged. The buildings occupied have been on the whole suitable, and no bad effects are attributed to their use.

*Improvements.*—Rangoon.—Two new barrack bungalows for the Infantry completed and occupied. Piles of Infantry hospital refooted.

Thayetmyo.—A new barrack in the redoubt for Royal Artillery in progress and nearly completed. Work temporarily suspended for want of funds. A

large magazine in course of erection outside the redoubt. Gratings supplied *Madras*. to Royal Artillery bath rooms.

Tonghoo.—Artillery barrack cookhouse enlarged and repaired.

Port Blair.—Bamboo verandahs erected over the barrack doors to exclude the rain during the south-west monsoon.

*Improvements sanctioned.*—Rangoon.—A new barrack bungalow for Infantry. A reservoir for storage of water for Infantry.

*Improvements proposed.*—Port Blair.—A recreation room, containing theatre, reading room, and two skittle alleys.

*Venereal Disease.*—The following table has been prepared to show the prevalence of syphilis at the different stations in the Command during each of the years 1873–1877.

		Ratio of Admissions for Syphilis per 1,000 of Strength.				
		1877.	1876.	1875.	1874.	1873.
<i>Where Lock Hospital existed.</i>						
Years.						
1868. Madras - - -	-	114.55	89.62	135.66	69.77	62.77
1860. Saint Thomas' Mount - -	-	130.84	58.65	100.82	76.27	42.86
1859. Trichinopoly - - -	-	147.37	29.96	104.32	63.75	41.23
1860. Bellary - - -	-	301.77	174.83	201.76	305.36	266.52
1855. Bangalore - - -	-	143.93	39.10	91.73	133.33	89.23
1859. Cannanore - - -	-	31.54	76.15	39.34	47.54	17.41
1860. Wellington - - -	-	59.27	76.06	149.11	67.94	98.43
1859. Secunderabad - - -	-	129.11	110.87	116.21	43.83	55.97
1861. Kamptee - - -	-	67.47	81.41	132.34	290.45	132.33
1871. Seetabuldee - - -	-	183.67	100.00	65.22	282.61	21.28
1871. Rangoon - - -	-	129.51	107.82	100.65	65.37	84.41
1869. Thayetmyo - - -	-	41.96	56.38	39.71	32.45	23.98
1874. Tonghoo - - -	-	55.15	126.91	50.96	114.76	—
<i>Where no Lock Hospital existed.</i>						
Tongoo - - -	-	—	—	—	—	91.68
Palaveram - - -	-	—	—	32.26	36.36	31.58
Poonamallee - - -	-	193.55	326.67	250.00	135.30	171.87
Ramandroog - - -	-	68.97	96.15	463.41	413.61	42.55
Calicut - - -	-	144.33	83.83	141.41	20.40	121.95
Mallapooram - - -	-	95.74	10.75	52.08	—	37.50
Port Blair - - -	-	44.78	44.78	102.36	—	19.60

The admission ratio, 119.37 per mille, exceeds that of the previous year by 30.17. The death rate, .09, is identical with that of 1876. Of stations provided with lock hospitals, Cannanore, Wellington, Kamptee, Thayetmyo, and Tonghoo alone show a decrease. At all stations in the Presidency Circle, and at Bangalore, the increase has been considerable. Bellary had the highest admission rate in the Command, viz., 301.77 per mille of strength. In previous year it was only 174.83. Of stations unprovided with Lock Hospitals, Poonamallee alone merits notice, the strength at the others being too small to yield reliable information. The admission rate at Poonamallee has decreased considerably, being 193.55 against 326.67 in previous year. For reasons stated in last year's report, the efficiency or otherwise of Lock Hospitals can be best shown by taking admissions for gonorrhœa and primary syphilis as data and drawing conclusions from them alone. The admission ratio for primary syphilis and gonorrhœa combined for the whole Command amounts to 188.27 per mille, exceeding that of 1876 by 53.71. Compared with 1876 the Presidency Circle shows an increase in both affections. Primary syphilis being greater by 78.80 and gonorrhœa by 58.70 per mille of strength. In the Mysore Circle primary syphilis shows an increase of 74.89 and gonorrhœa of 41.02 per mille.

In the Hyderabad Circle the increase in primary syphilis is slight, viz., 17.51 per mille, while gonorrhœa shows a decrease of 20.61. In Burmah,

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primary syphilis shows a decrease of 3·52 per mille of strength, gonorrhœa an increase of 3·80.

During the past year the prevalence of famine tended considerably to increase venereal disease; poverty and famine-stricken women from villages near and distant from military stations having, it is stated, prostituted themselves in order to live, and it is asserted that many of them were themselves diseased when first they came to cantonments, a circumstance which points to the extensive prevalence of venereal disease among the native population.

No special arrangements or facilities exist at any station for nightly private ablution. In a memorandum submitted by me to Government on 5th May 1876, I drew attention to the necessity for arrangements of this nature.

*Bombay.**Bombay.*

Surgeon-General Stewart reports:—

“*Barracks.—Baroda.*—As remarked in last year’s return, the barracks are old, dilapidated, and defective in general construction; they require entirely rebuilding, as the only efficient remedy for their numerous radical defects.

“*Ghoripuri.*—Seven new blocks, with quarter guard and cells on the standard plan, have been commenced.

“*Ahmedabad.*—The new barracks, referred to last year as in course of construction at this station, have been completed and taken into occupation, and are reported by the Medical Officer as excellent in all particulars.

“*Kurrachee.*—The Medical Officer recommends that the doors of the infantry barracks at this station be half glazed, so as to give the rooms a less cheerless aspect.

“*Cells.—Colaba.*—The cells are reported as badly situated, being built on a low plinth below the level of the road, and as not suited for protracted residence.

“*Deesa.*—The ventilation of the cells referred to last year has been improved by the removal of the wall which surrounded them and obstructed the breeze.

“*Baroda.*—The garrison cells are represented as small, very hot, and ill-ventilated.

“*Ventilation and Lighting.*—The ventilation of the barrack rooms has, for the most part, been satisfactory: but complaints regarding the lighting have been general, the kerosene lamps referred to in previous annual reports having only been supplied to a few stations.

“*Urinals.*—The urinals are generally iron receptacles placed in detached erections of a temporary nature, which are freely ventilated.

“*Water Supply.*—Macnamara filters have now been furnished to most of the stations in the Command, but the number allowed is insufficient. There should be at least one filter for each block of married soldiers’ quarters occupied. In the scale no provision has been made for schools or workshops. These two should each possess a Macnamara filter.

“*Dieting.*—At some stations the potato crop failed, and other vegetables with extra bread had to be substituted for a portion of the potato ration. Recommended that malt liquor be substituted for the spirits the men are allowed to purchase in the canteen.

“*Gymnasia.*—At stations where gymnasia exist gymnastic exercises have been favourably reported upon.

“*Venereal.*—1. Under Bombay Act, No. 3, of 1867, sect. 1, lock hospitals exist at the following stations:—Deolali, Ahmedabad, Deesa, Aden, Kurrachee, Poona, Kirkee, Ahmednagar, Belgaum, Mhow, Neemuoh, and Nasirabad.

“2. In the lavatories at several stations a special closet, with a special supply of water, is set apart for private ablution.

“3. The amount of venereal disease was somewhat greater than in recent years, probably due in a great measure to the famine having driven destitute women into the cantonments, and to the practice of illicit prostitution.”

# APPENDIX.

## APPENDIX No. I.

### REPORT ON THE PROGRESS OF HYGIENE FOR THE YEAR 1877 AND PART OF 1878.

By F. DE CHAUMONT, M.D., Surgeon-Major, Professor of Military Hygiene,  
Army Medical School, Netley.

#### I. *Legislation.*

DURING 1877 no legislation took place in this country of any special importance, almost the only Act bearing on hygiene being that for the better regulation of canal boats as dwellings. During 1878 there have been passed the Public Health (Water) Act (41 & 42 Vict. cap. 25), which provides that it shall be the duty of every rural sanitary authority to see that every house has an available supply of good water within a reasonable distance; an Act to amend the law relating to Public Baths and Wash-houses (41 Vict. cap. 14), to allow of the provision of covered swimming baths; the Contagious Diseases (Animals) Act, 1878 (41 & 42 Vict. cap. 74); and the Consolidated Factory and Workshops Act, 1878 (41 Vict. cap. 16). The necessity for further legislation has, however, been made evident in several directions, and in none more, perhaps, than in the Adulteration Act, which, as now worded, tends to be nugatory. The Act states that the sale of the adulterated article must be to the prejudice of the buyer, so that if an inspector buys a sample for the purpose of analysis it may be held to be not to his prejudice, and the prosecution fail. This has actually been so decided in one case in Scotland, and it appears to be the opinion of some at least of the English judges that it is the legal interpretation of the Act. It is obvious that this was not the intention of the framers of the statute, and that a new Act will be necessary which shall make the fact of adulteration itself a penal one, if the article is sold or offered for sale under any circumstances.

Indirectly affecting the question may be noted the new Act, which is really the reviving of that of half a century ago, abolishing all weights and measures other than Imperial, with a reservation in favour of the metrical system.

#### II. *Work of Societies, &c.*

1. The Sanitary Institute of Great Britain held its first provincial meeting at Leamington in October 1877, and its second at Stafford in October 1878. Both have been highly successful, and the exhibition of sanitary appliances varied and interesting.

The Institute has now established a system of examination for surveyors and inspectors of nuisances, to whom certificates of competency are granted, if successful. The examinations take place thrice a year, in February, June, and November. The desirability of some such test of fitness is obvious, and it is to be hoped that in due time it will become obligatory.

2. In the Public Health section of the British Medical Association, which met this year at Bath, several papers of interest were read. Among them was one on Water Filtration, by Dr. Lane Nottle, which will be noticed further on.

3. The official report of the "Congrès International d'Hygiène, de Sauvetage, et d'Economie Sociale," which met at Brussels in 1876, was published in two large octavo volumes in 1877. It contains a number of papers and discussions of great interest.

4. In September 1877 the 50th anniversary meeting of the German Society of Naturalists and Physicians (Deutsche Versammlung Naturforscher und Aerzte) took place at Munich, under the honorary presidency of H.R.H. Duke

Karl-Theodor and the direction of the renowned Professor Max von Pettenkofer. The meeting was a very large one and highly successful. Of course the chief interest was centred in the papers and addresses of a more general scientific character, but there were also several in the Hygienic section worthy of note. The report has since been published, in one volume, small quarto. Among the papers may be mentioned Prof. Rosenthal's (Erlangen) "On the examination of Soil," and Prof. Orth's (Berlin) on the same subject; also one by Prof. Carl Voit "On the assimilation of certain Articles of Food in the Alimentary Canal of Man." Some papers of interest were also given in the section of Military Medicine, and published in the "Vierteljahrschrift für öffentliche Gesundheitspflege" and other journals.

During my visit to Munich on that occasion I had an opportunity of visiting the celebrated laboratory of Pettenkofer, which will soon be replaced by the newer and more extended one now in process of completion.

The meeting of the present year (1878) was held in Cassel, but I was unable to attend it.

5. The German Society of Hygiene held its meeting in 1877 in Nürnberg; a report of the papers has appeared in the "Vierteljahrschrift," &c.

The meeting of the present year was held at Dresden.

6. The "Congrès International d'Hygiène," in continuation of that held at Brussels in 1876, was this year held at Paris, in connexion with the Great Exhibition. The general meetings took place at the Trocadéro Palace, and the sectional meetings at the Pavillon de Flore in the Tuileries. It was attended by a very large number of people from various countries, but England was, on the whole, smally represented, perhaps on account of the time of meeting clashing with that of the British Medical Association. Besides numerous papers in the sections, six general questions were discussed at the general meetings, reports upon which were prepared beforehand and circulated among the intending members. The following were the subjects:—

1. *Hygiene of newly-born Children*; by MM. Bergeron, Bertillon, and Marjolin.
2. *Contamination of Water-courses*; by MM. Schlösing, A. Durand-Claye, and Proust.
3. *Hygiene of Food*; by MM. Bouley, Nocard, Bouchardat, and A. Gautier.
4. *On the Duellings of the Poorer Classes*; by MM. Emile Trélat and O. Du Mesnil.
5. *On the Hygiene of Trades*, with particular reference to metallic poisoning; by MM. Gubler and Napias.
6. *On the Prophylaxis of Infectious and Contagious Diseases*, discussing those demanding isolation, and the means of carrying it out; by MM. Fauvel and Vallin.

This last report was especially well drawn up, but unfortunately the time for discussing it was too short and the discussion too desultory to be of much use beyond calling attention to the question.

In the Exhibition itself there was a large number of sanitary appliances, but few that presented much novelty, the greater number being already pretty well known in this country.

The next meeting of the "Congrès d'Hygiène" was fixed for 1880, to take place in Turin.

An Italian Society of Hygiene has also just been started at Milan.

### III. Literature.

1. *A Manual of Practical Hygiene*, by E. A. Parkes, M.D., F.R.S. 5th edition, edited by F. De Chaumont, M.D.

A new edition of this well-known work having been called for, I undertook the task of editing it, at the request of the proprietors, Messrs. J. and H. Churchill. The plan of the author has been in the main adhered to, although it was necessary to introduce some changes. In particular, the chapter on water analysis has been a good deal altered, both in order to introduce later methods of working, and also to render it more useful as a practical guide in the laboratory. Another feature, of importance in a work of reference, is a much more extended index. The index to the previous edition was so meagre as to be practically inconvenient from the difficulty of finding

a reference easily. Some additional illustrations have also been introduced. The bulk and price of the volume has been somewhat increased, but a change of this sort is inevitable in any scientific work, particularly when it deals with a subject which is necessarily progressive, but can only be partially formulated in set rules and principles.

2. "Handbuch der Militär-Gesundheitspflege," von Roth and Lex.

The third and concluding part of this great work made its appearance in September 1877. Various circumstances, among which were the lamented death of one of the joint authors, Dr. Rudolph Lex, and the absence of Dr. Roth in America for a considerable time during 1876, combined to delay its appearance. Now, however, that the work is finished it is certainly the most complete and detailed treatise on the subject. This concluding volume treats of clothing and equipment, army diseases and statistics, with a copious appendix of additional information on various points that have become known since the printing of the text. The chapter on clothing gives full details on the material of clothing, illustrated by means of drawings from Wiesner and Schlesinger, which, however, give rather exaggerated ideas of the different fibres. The chapter on equipment gives information both on the German equipment and on that of other nations. The section on service treats of recruiting and the work of the soldier, including his drill and training, marching, &c., as well as the arrangements for the care of his health during his service. At p. 156 a table\* is given of the military statistics of European nations, showing the proportion of armed force to population, &c. One column gives the per-centage of unfit recruits to total examined, in which the per-centage for England is stated at the enormous figure of 86. At this rate the whole male population of the United Kingdom reaching the military age would hardly suffice to supply the necessary number of recruits. It is evidently a misprint, probably for 38·6, which is the per-centage for 1874. The highest proportion in our army between 1860 and 1876, inclusive, is that for 1863, when 11,487 recruits were examined and 5,070 rejected, or 44·1 per cent.; whilst the total number for the 17 years (1860-76) was 426,327 examined and 142,589 rejected, or 33·5 per cent. The section on diseases of soldiers is very full, and the closing section on statistics contains much detailed information, both on the statistics of the German army and also on those of the other great modern states, including the United States of America. A summary of the statistics of army medical officers is interesting, although it does not give much information concerning those of the German army, about whom accurate data are not obtainable. In the Austrian army the average age of medical officers was (in 1870) 40 years. A table from Chenu shows that the death rate of medical officers in the French army is more than double that of other officers, a ratio which nearly corresponds with that in our own army. As regards mortality in the field the following figures are given:—

Prussian war of independence, 1813-15; 104 per 1,000 died of medical officers.

French army against Constantine, 1837; 167 per 1,000 died of medical officers against 78 per 1,000 other officers.

Austrian army in 1848-50; 238 per 1,000 died of medical officers.

French army in Crimea, 1854-56; 182 per 1,000 died of medical officers against 73 per 1,000 of other officers.

English army, Crimea, 1st year; 132 per 1,000 died of medical officers. 2nd year; 26½ per 1,000 died of medical officers. Mean; 67½ per 1,000 died of medical officers.

Russian army, 1854-6; 440 per 1,000 died of medical officers. (Out of 13 American surgeons in the Russian service only five survived. Out of 35 German only 11.)

\* Taken from "Vergleichende Darstellung der Wehrverhältnisse in Europa zu Land und zur See (Wien, 1874).

French army in Mexico; 200 per 1,000 died of medical officers against 40 per 1,000 of other officers.

The shorter the war the fewer proportionately perish of medical officers. In the short war in Italy in 1859 (75 days) no medical officer died in the French army; in the Austrian only four, and those from wounds in action. In the long civil war in America 409 medical officers perished. In the Franco-German war 46 German medical officers perished, or 14.09 per 1,000. Other officers died of wounds in action in much greater number, but the deaths of medical officers from disease were 50 per cent. more than those of combatant officers.

A useful table of weights and measures is given at the end of the work.

3. "Jahresbericht über Militär-Sanitätswesen, 1875-76," bearbeitet von Dr. Wilhelm Roth.

This is an annual report furnished by the same able writer on the progress made in matters connected with military medical and sanitary affairs. By the help of a staff of fellow workers, officers of his own and foreign armies, the various points of interest occurring during the period have been collected. The present report (the third of the series) includes the years 1875-76, that of 1875 having been delayed on account of the author's absence in America as Commissioner at the Philadelphia Exhibition. It is a valuable bibliographical record of works and papers relating to military medical matters, not confined to Hygiene merely, but extending over the whole wide range of subjects with which an army surgeon has to deal.

The Report for 1877 made its appearance during this autumn (1878).

I may also here notice the publication of the "Kriegs-Sanitäts-Ordnung" (Medical Regulations) of the German Army, January 10, 1878; which contains very full instructions for the sanitation of the troops both in garrison and in the field.

4. "Ueber Entwicklung und Gestaltung des Heeres-Sanitätswesens der Europäischen Staaten vom Militärisch-geschichtlichen Standpunkte," von Emil Knorr, Major.

Of this work (the first parts of which were noticed last year) the fourth part was published in the end of 1877, and the fifth part in the present year. These treat of the medical departments and arrangements of the English, Russian, Austro-Hungarian, Italian, Dutch, Belgian, and Scandinavian armies. The details in each case are very full, although the rapid changes of modern days make some of the information already obsolete, particularly in the case of our own service, which has been so long in a transition stage.

5. "De Militaire Geneeskundige Organisatie en de Geneeskundige Dienst te Velde bij het Engelsche Leger," Parallelen en Critieken door Dr. M. W. C. Gori, lector in de Militaire Genees-en heilkunde aan de Universiteit van Amsterdam.

This pamphlet (dedicated to Professor Longmore by Dr. Gori) gives an excellent résumé of the existing conditions of our medical department, in which many points are held up for praise and imitation by other nations. Special stress is laid upon the hygienic arrangements for our troops and on the advantages derived from the Army Medical School at Netley.

6. "Tidskrift i Militär Helsovård utgifven af Svenska Militärläkare föreningen." Stockholm.

This is a journal of military hygiene published by the Military Medical Society of Sweden; started in 1876 and appearing every four months.

7. Kraus, Grieb, and Pickler. "Encyclopädisches Wörterbuch der Staats-arzneikunde." Stuttgart.

This great work, a dictionary of forensic medicine, civil and military hygiene, veterinary science, &c., has at length been completed.

8. Kirchner. "Lehrbuch der Militär-Hygiene," second edition.

This has also been completed.

9. Forster. "A Manual for Medical Officers of the Militia of the United States." New York, 1877.

10. Chassagne et Emery-Desbrousses. "Guide Médical Pratique de l'Officier." Paris, 1876.
11. Proust. "Traité d'Hygiène publique et privée." Paris, Masson.  
A good compendium of the subject, presenting no very special feature.
12. Bowditch, H. T., M.D. "Public Hygiene in America." Being the Centennial Discourse delivered before the International Medical Congress, Philadelphia, September 1876.

This gives an able sketch of the rise and progress of sanitary science in America. Appended is a digest of American sanitary law by H. G. Pickering.

Numerous treatises on Hygiene have also appeared, or are announced, in different languages, which are of course merely reproductions for the most part of already known facts.

#### IV. Special Points of Hygiene.

1. *Water*.—A table of analyses of water sent for examination to Netley is appended, having been compiled from our Laboratory Records by Surgeon-Major J. Lane Notter. It is in some respects more detailed than the table of last year, as, for instance, in the microscopic description of the sediment, and also by the introduction of additional points in the quantitative analysis, although some of the qualitative results are omitted as being unnecessary when the quantitative are given. The "Remarks" give the report furnished as to the quality of each sample. Of the 65 samples there were—

"Fit for use"	-	-	-	-	25
Usable or fit after filtration	-	-	-	-	16
Condemned on account of—					
Organic impurity	-	-	-	-	19
Mixture with sea-water	-	-	-	-	2
Excessive hardness	-	-	-	-	2
Taste of tar	-	-	-	-	1
Total	-	-	-	-	65

The following mean results are obtained :—\*

—	Chlorine.	Ammonia.		Total Oxygen.	Oxygen for Organic Matter.	Nitrous Acid.	Hardness.	
		Free.	Albuminoid.				Total.	Fixed.
25 fit for use	2.5	0.0080	0.0380	0.4632	0.3992	0.1860	14.8	5.3
16 require filtration	3.5 (2.2)†	0.0144	0.1500	1.0200	0.9162	0.2937	11.7	4.4
19 condemned for organic impurity.	3.3	0.2398	0.2111	1.1090	0.8527	0.7779	14.5	6.7
2 mixed with sea water	70.5	0.0000	0.0650	0.8000	0.5900	0.0575	36.0	26.6
2 excessive hardness	36.1	0.0180	0.1050	0.8000	0.5200	0.7189	55.1	34.1
1 taste of tar	4.3	0.0508	0.1072	1.1400	0.8600	—	23.1	8.7

From this table we see that the ammonias, both free and albuminoid, show progressive increase from *good* to *bad* waters; that the organic matter determined by the expenditure of oxygen shows a marked difference in favour of good waters, but not between *usable* and *bad*; that the nitrous acid shows a normal progressive difference; that the average of total oxygen required for oxidisable matter is under 0.5 per million in the *best* waters and above 1.0 in the others; the chlorine is also slightly less in *good* waters, but the difference is not great; the hardness seems to follow no regular rule.

Mr. Wanklyn announced some time ago a method of detecting cellulose in water, which would be of importance if it could be effected; it appears, how-

\* Chlorine and hardness in grains per gallon; other constituents in milligrammes per litre, or parts per million.

† Average only 2.2, if we omit one unusually high number, viz., No. 58 in list, which shows 22.4 grains.



ever, to be merely the permanganate process we have all along used at Netley, but why the reaction should be limited to cellulose does not appear very clearly. The permanganate process fell into undeserved discredit in some quarters in this country, probably on account of more being expected from it than it was capable of yielding; but it has its own value, and is of considerable use, along with other processes, in aiding us to form a proper estimate of the goodness of a water.

In some samples recently received from Ireland, stated to be rain-water, so much alkalinity was found as to excite the suspicion that something had found its way accidentally into the vessels used in its carriage. The alkali turned out to be caustic lime, to the extent of about 16 grains to the gallon, and there seems reason to believe that it has been taken up from the cement lining the tanks in which it has been stored. The question is of some importance, and I hope to have an opportunity of investigating it further.

*Filtration.*—This question is still exciting attention, and the merits of different methods have been a good deal discussed. We have from time to time carried out a large number of experiments at Netley on this subject, and the following may be stated as the general result:—

1. *Animal Charcoal*, in loose fragments. This has a very powerful immediate purifying effect; its action is rapid, and, with a sufficient depth of charcoal, water may be carried through pretty nearly as fast as it will run with a moderate pressure. The charcoal acts better somewhat compressed than quite loose. If the water is to be used immediately, the power of the charcoal will last a considerable time, but it is prudent to clean or renew it frequently. The passing of distilled water through it and the use of potassium permanganate are useful, but the only effectual method of cleaning is re-burning.

When water which has been filtered through charcoal is stored for any time it soon begins to show evidence of low forms of life, and after a time a more or less abundant sediment of organisms becomes formed. This takes place even when analysis immediately after filtration shows no appreciable amount of organic matter by the albuminoid ammonia process. This may arise in one of two ways, viz., either very minute germs pass through the charcoal untouched, or the phosphates yielded by the charcoal to the water furnish pabulum for germs from the atmosphere. Probably both causes are at work, for we know that phosphates are yielded by the charcoal, and Dr. Notter's observations have shown that although charcoal may arrest decomposing albumen, it allows fresh recent albumen to pass through unchanged. When water is allowed to remain in contact with animal charcoal which has been used as a filter it takes up again in process of time as much organic impurity as it had before, and sometimes even more; occasionally it becomes distinctly offensive. Hence it would seem to be dangerous to allow filters to remain permanently in cisterns, as is the practice in some instances; the charcoal cannot be aerated, and must therefore soon get impure.

2. *Charcoal in porous Blocks*, such as the silicated carbon and similar forms. These are powerful filters at first, but they are apt to clog and require frequent scraping, especially with impure waters. Water filtered through them and stored shows signs of the formation of low forms of life, but in a less degree than with the loose charcoal. After a time the purifying power becomes diminished in a marked degree, and water left in contact with the filtering medium is apt to take up impurity again, although perhaps in a less degree than is the case with the loose charcoal.

We may therefore say that on the whole the loose charcoal is the more practically useful, as its power lasts longer, it does not tend to clog so easily, and it is more easily cleaned. In neither case, however, is it advisable to store the filtered water or to have water long in contact with the medium. A contact of four minutes is sufficient to purify water with loose charcoal, whereas the solid blocks take a much longer time.

3. *Inorganic Substances.*—Of these the most important at present before the public is the spongy iron. This is a very powerful filtering substance, and is used generally in contact with what is called "prepared sand," a mixture of fine gravel with *pyrolusite*, crude binoxide of manganese. The object of this last substance is to remove the small quantity

of iron taken up by the water. The action of spongy iron is slow but complete; about 22 minutes is the time of exposure, and this is usually sufficient to purify all but very impure waters. The water filtered shows no tendency to favour the growth of low forms of life, and may be stored with impunity; water may also be left in contact with the medium for an indefinite period without undergoing any deterioration.

Another inorganic substance is that used in the "Filtre Chanoit," exhibited at the Paris Exhibition. It is finely ground slag (*scorie de fonte*), and is said to purify water well. I have not yet had an opportunity of testing it. The filter itself is so arranged as to compress the air inside and so aerate the water, as well as clean the filtering medium when required.

Another substance has also been brought to my notice, apparently inorganic, said to be very powerful. Experimental trials are now being made with it.

Mr. Wigner has published in the "Analyst" (October 1878) some experiments with the silicated carbon and spongy iron filters, done with the Margate water, which appears to be very bad. The results are adverse to the spongy iron, and so remarkably at variance with our results at Netley that I cannot but suspect some unobserved error. I am about to repeat and extend our series of experiments, but the former series were done with every precaution against error, so that I think we can rely upon the main results.

Mr. Wigner has published in the Sanitary Record (and since re-printed) a number of analyses of waters from seaside places, showing a great diversity of composition and of degrees of purity.

2. *Air, Ventilation, Barrack and Hospital Construction, &c.*—With reference to the question of air analysis I had lately the opportunity of visiting the observatory of Montsouris at Paris, where I was shown all the arrangements in operation by the kind courtesy of M. Marié-Davy, the Director. Besides the various meteorological observations a complete chemical analysis is made daily. The method for determining the carbonic acid is by absorbing it with liquor potassium, driving it off again with hydrochloric acid, and then measuring it. The ozone is collected in a solution of arsenite of sodium and iodide of potassium, the liquid being titrated before and after the experiment. The quantity of air is measured in every case by means of accurate meters. The rain for analysis is collected on large sheets of glass, slightly bent, so as to direct the flow into a collecting vessel.

A similar plan, modified in certain particulars, is now in operation in Glasgow, a description of the arrangements of which has been published in the Report on the Air of Glasgow, presented to the Committee of Health of the Magistrates and Council, 29th July 1878. The observations have been carried on by Mr. E. M. Dixon, B.Sc., and on his retirement by Mr. Dunnachie, in co-operation with the medical officer of health. The results in the most recent Report rule somewhat low, especially as regards the carbonic acid, but they are higher than in former Reports, and more accordant with the results obtained by other observers. Probably this arises from improvements in the methods of observation, as mentioned in a note by Mr. Dunnachie. It may be further mentioned that Dr. Angus Smith called attention to the inaccuracy of the plan of aspiration, as often performed, in a paper read before the Royal Society in December 1877.\* The difference of result between aspiration and washing was (for  $\text{CO}_2$ ) as 438 to 320, or 27 per cent.

In connexion with the sanitary exhibition at Leamington last year, an interesting series of experiments was carried on at Kew in May of this year (1878), by a Committee of the Sanitary Institute, with a view to decide on the respective merits of various forms of extract cowl. The members of the committee were Capt. Douglas Galton, C.B., F.R.S., Mr. W. Eassie, C.E., and Mr. Rogers Field, C.E. The result they arrived at was that none of the forms examined showed any superiority over an ordinary straight tube, but in fact gave inferior results, the only form coming fairly well out of the ordeal being the common lobster backed cowl. A good deal of adverse criticism on the experiments has taken place, but the names of the committee are a sufficient guarantee that the inquiry was carefully made and that the question demands at least further investigation.

\* Proc. R. S., No. 184, vol. xvi., p. 514.

No.	Station.	Source.	Physical Characters.	Microscopic Characters.	Qualitative Tests.		
					Gold Chloride.	Nitric Acid.	Iron.
1	Admiralty, London.	Pump - -	Yellow, no turbidity, large amount of sediment, flat taste, no smell.	Vegetable debris, Lichen cells, spores of Fungi and minute Oscillatorians, no Desmids or Diatoms, animal forms were Oxytricha, small solitary Vorticella, Glaucoma, Monadina, Amœbæ.	Olive green reaction.	Present	Trace
2	Aldershot -	Well, at Governor's House, Military Prison.	Slightly yellow, no turbidity, small sediment, lustre good, no smell, taste good.	A few spores and mycelium of Fungi, no other trace of animal or vegetable life.	Shot pink reaction.	Present	Trace
3	Aldershot -	Well, No. 17, Havellock Street.	Slightly yellow, large sediment, good lustre and taste, no smell.	Mineral grit and amorphous matter, vegetable debris, spores and mycelium of Fungi, colourless filaments of Oscillatorians, a few Monadina.	No reaction	Present	Trace
4	Aldershot -	Well, north end of K. Lines, North Camp.	Slightly yellow, small sediment, good lustre and taste, no smell.	Amorphous matter and mineral grit, no evidence of animal or vegetable life.	No reaction	Present	Trace
5	Aldershot -	Well at Deputy Commissary-General's Quarters, 25' deep.	Slightly yellow, very good lustre and taste, no smell, small sediment.	Very small sediment, consisting of a little mineral grit only.	No reaction	Small	Trace
6	Aldershot -	Well, 17' 6" deep	Clear, very large sediment like iron rust, good lustre, fair taste.	Large deposit of ferruginous matter, Monadina, and minute Amœbæ.	Slight blackening.	Present	Large
7	Aldershot -	Well, No. 2, I. Lines, South Camp.	Yellow, sediment like iron rust, good lustre, fair taste, no smell.	Deposit of ferruginous matter, sand and mineral grit, no trace of animal or vegetable life.	Slight blackening.	Present	Large
8	Aldershot -	Well, No. 2, K. Lines, South Camp.	Yellow, no turbidity, some sediment, good lustre and taste, no smell.	Mineral grit, spores of Fungi, cotton and woollen fibre, vegetable tissue, one large Acaarus, and several groups of Protococcus.	Shot pink reaction.	Present	Present
9	Armagh -	New well, 36' deep	Clear, no turbidity, good taste, no smell.	Amorphous matter, old linen and cotton fibre invested with Fungi, decaying vegetable matter, Rotifer vulgaris, ciliated Animalcules, Monadina; Cosmarium, the only vegetable form present.	No reaction	Present	Trace
10	Armagh -	Well, 38' deep, through boulder clay.	Slightly yellow, and slight turbidity, flat taste, no smell.	Mineral grit, minute Amœbæ, particles of carbonate of lime, Enochlys, Monads.	Slight blackening.	Present	Trace
11	Armagh -	City water supply	Slightly yellow, turbid, sediment large, fair lustre, no smell	Mineral grit and spores of Fungi, epidermis of grass, cotton fibre, dyed wool, Synedra, Navicula, Cyclops, Quadricornis, Stylonychia, Cyclotella, gonidia of Lichens, Monadina, Paramecium, Vorticella, Anguillula.	Much blackening.	Large	Trace
12	Belfast -	Water main from Belfast Reservoir.	Slightly yellow, no turbidity, large sediment, good lustre and taste.	Vorticella, Cyclotella, Synedra, minute Euglypha, Difflugia, Oxytricha, Coleps, Coccudina, Cutaneous Epithelium, Melosira, Enochlys, Perinema, Trinema, large Oscillatorians, Oscillatorian filaments, articulated and colourless, with no branching.	Shot pink reaction.	Present	Trace

Hardness. — Degrees of Clark's Scale.		Chlorine, Grains per Gallon.	Ammonia, Parts per Million.		Solids, Grains per Gallon.		Oxygen required (de- termined by Permanganate of Potassium, Heat, and Sulphuric Acid), Parts per Million.		Nitrous Acid, Parts per Million.	Remarks.	No.
Total.	Fixed.		Free.	Albu- minoid.	Total.	Fixed.	For Total Oxidizable Matter.	For Organic Matter only.			
23°80	16°85	6·9936	0·2016	0·1232	59·6000	56·9100	0·7400	0·4000	1·1500	Unfit for use - -	1
7°00	3°85	2·8272	None	0·2736	19·9500	18·2000	0·5000	0·4600	0·1150	The albuminoid ammonia is in excess, probably vegetable impurity, should be filtered carefully before use.	2
13°30	7°35	3·4224	None	·1360	27·2300	24·7800	0·5800	0·5800	None	Filtration advisable before use.	3
7°70	2°45	4·5136	None	0·0536	23·4500	16·9750	0·8600	0·8600	None	Good in its present state, though some evidence of previous contamination.	4
5°60	2°80	2·0336	None	0·0640	10·1500	8·7500	0·3000	0·3000	None	Fit for use - -	5
6°65	6°65	2·8272	None	None	19·2500	18·5500	0·3000	0·3000	None	Fit for use - -	6
13°12	9°27	5·1088	None	0·0548	32·2000	26·9500	0·4200	0·3400	0·1150	Pure and fit for use -	7
17°50	14°00	7·8864	0·3640	0·4500	44·8000	37·1000	0·4600	0·4200	0·1150	Bad, unfit for use -	8
23°10	5°95	1·4384	0·0754	0·1596	29·7500	23·7000	0·4600	0·4600	None	Usable after filtration	9
11°72	4°72	1·5376	0·4032	0·3968	22·0500	21·0000	0·6200	0·3800	0·7900	Unfit for use - -	1
6°82	1°75	0·6448	0·0464	0·2600	15·4000	14·000	1·6200	1·6200	None	Some organic impurity, probably of a vegetable origin. Filtration advisable before use.	11
7°60	2°45	0·7440	None	0·1896	15·0500	14·0000	2·3100	1·7400	1·7350	Impure - -	12

No.	Station.	Source.	Physical Characters.	Microscopic Characters.	Qualitative Tests.		
					Gold Chloride.	Nitric Acid.	Iron.
13	Cavan	New well, 51' deep	Yellow, slightly turbid, large sediment, fair lustre, earthy taste.	Mineral grit, minute Amæbæ, dyed wool, cotton fibre, spores of Fungi.	Slight blackening.	Present	Trace
14	Cavan	New well, 51' deep	Slightly yellow, small sediment, flat taste, no smell.	Mineral grit and particles of carbonate of lime, no trace of animal or vegetable life.	Black deposit	Present	Trace
15	Chatham	Well, 133' deep, at Chattenden Barracks.	Yellowish, clear, large sediment, fair lustre and taste, no smell.	Ferruginous matter, crystalline particles of carbonate of lime, no trace of animal or vegetable life.	Black deposit	Large	Large
16	Chatham	Chattenden Barracks.	Clear, no turbidity, very small sediment, good lustre and taste, no smell.	A few particles of mineral grit, crystals of carbonate of lime, no trace of animal or vegetable life.	Slight blackening.	Trace	Trace
17	Clonmel	Married Soldiers' Quarters, well 24' deep.	Slightly yellow, no turbidity, large sediment, good lustre and taste, no smell.	Mineral grit and crystals of carbonate of lime, no animal or vegetable life, vegetable fibres of a peaty character.	No reaction	Present	Trace
18	Clonmel	Pump in Infantry Barracks.	Slightly yellow, no turbidity, good lustre and taste no smell, small sediment.	Mineral grit, crystals of carbonate of lime, some vegetable debris, no animal or vegetable life.	No reaction	Present	Trace
19	Cork	Cat Fort, tank supplied by rain from roof of buildings.	Clear, no turbidity, very small sediment, good lustre and taste, no smell.	Mineral grit, Mycelium and spores of Fungi, and numberless minute Torulæ.	Black deposit	Large	Present
20	Cork	Cork Waterworks Company's, obtained from River Lee,	Yellow colour, no turbidity, sediment present, lustre and taste very good, no smell.	Amorphous matter, amber-tinted Fungus, vegetable cells, wool, cotton, and linen fibre, Anthophysa, Monadina, Halteria, Dileptus, Anguillula, Closterium, Conserveæ, Synedra, Oscillatorians, Fragillaria, Tabellaria.	Black deposit	Trace	Trace
21	Exeter	Water - works Company.	Clear, no turbidity, small sediment, good lustre and taste, no smell.	A few particles of mineral grit, a few minute Amæbæ, and some Monadina.	No reaction	Trace	None
22	Fermoy	New Barracks, No. 1 Pump (unfiltered).	Clear, no turbidity, small sediment, good lustre and taste, no smell.	Brown granular highly ferruginous matter, no living forms of any kind.	No reaction	Present	Large
23	Fermoy	New Barracks, No. 1 Pump (filtered).	Whitish, small sediment, good lustre and taste, no smell.	Granular matter mostly ferruginous, no living forms of any kind.	No reaction	Present	Present
24	Fermoy	Old Barracks, No. 1 Pump (unfiltered).	Slightly yellow, small turbidity, good lustre and taste, no smell, small sediment.	Carbonate of lime, ferruginous matter, mycelium, and spores of Fungi, decaying vegetable matter, and minute and starved infusoria.	No reaction	Present	Present
25	Fermoy	Old Barracks, No. 1 Pump (filtered).	Slightly yellow, slight turbidity, good lustre and taste, no smell, small sediment.	Sandy particles and grains of charcoal with carbonate of lime and ferruginous matter.	No reaction	Present	Large
26	Fermoy	Old Barracks, No. 2 Pump (unfiltered).	Slightly yellow, no turbidity, sediment present, lustre and taste good, no smell.	Mineral grit, crystals of carbonate of lime, no evidence of animal or vegetable life.	No reaction	Present	Present
27	Fermoy	Old Barracks, No. 2 Pump (filtered).	Slightly whitish, no turbidity, small sediment, very good lustre and taste, no smell.	Mineral grit, crystalline particles of carbonate of lime, no evidence of animal or vegetable life.	No reaction	Present	Trace

Hardness. — Degrees of Clark's Scale.		Chlorine, Grains per Gallon.	Ammonia, Parts per Million.		Solids, Grains per Gallon.		Oxygen required (de- termined by Permanganate of Potassium, Heat, and Sulphuric Acid, Parts per Million.		Nitrous Acid, Parts per Million.	Remarks.	No.
Total.	Fixed.		Free.	Albu- minoid.	Total.	Fixed.	For Total Oxidizable Matter.	For Organic Matter only.			
19°25	6°82	2°3312	0°1512	0°2624	38°3250	33°4250	1°5400	1°0600	1°3800	Unfit for use - -	13
17°50	4°90	2°3288	None	0°1800	37°8000	33°6000	1°1000	1°1000	None	Organic matter in slight excess, proba- bly vegetable, usable.	14
57°05	37°80	5°3080	0°2448	0°1824	78°8550	74°5500	0°7400	0°6200	0°3400	Unfit - -	15
56°00	31°50	5°3072	None	0°0864	69°3000	66°5000	0°5400	0°3400	0°5750	Not recommended for drinking purposes on account of its excessive hardness.	16
22°05	3°15	1°3392	0°0720	0°0369	29°7500	28°0000	0°4600	0°4200	0°1150	Fit for use - -	17
26°60	4°20	2°6288	None	0°0592	40°9500	38°1000	0°4600	0°4200	0°1150	Fit for use - -	18
3°50	2°45	0°5456	0°4248	0°1784	7°3500	5°9500	0°6200	0°3800	0°6900	Unfit for use - -	19
1°75	1°05	0°9428	None	0°1508	8°0500	7°0000	1°8200	1°5200	None	Impurity probably vegetable. Fit for use.	20
3°85	2°97	0°6448	N o	0°0457	7°5250	7°0000	1°0600	1°0600	None	Fit for use - -	21
16°10	4°72	1°4384	None	0°1080	29°4000	27°9500	0°3800	0°3800	None	Fit for use - -	22
16°10	4°20	1°4384	0°0684	0°0576	28°3500	26°9000	0°3800	0°3000	0°1300	Fit for use - -	23
22°40	8°40	3°3232	0°0384	0°0544	45°8500	42°0000	0°1800	0°1400	0°1150	Fit for use - -	24
22°40	7°00	3°3232	None	None	37°4500	36°0500	0°3400	0°2200	0°3450	Fit for use - -	25
21°70	7°00	2°6288	None	0°1008	39°9000	35°7000	0°2600	0°1000	0°4600	Rather hard, but fit for use.	26
21°70	7°00	2°6288	None	None	41°3000	35°3500	0°2600	0°1400	0°3450	Fit for use - -	27

No.	Station.	Source.	Physical Characters.	Microscopic Characters.	Qualitative Tests.		
					Gold Chloride.	Nitric Acid.	Iron.
28	Fermoy	No. 1 Pump Well at Station Hospital (unfiltered).	Slightly yellow, no turbidity, small sediment, good lustre and taste, no smell.	Amorphous matter, crystals of carbonate of lime, no evidence of animal or vegetable life.	Slight shot pink reaction.	Present	Trace
29	Fermoy	No. 3 Well, New Barracks.	Slightly yellow, no turbidity, very large sediment, fair lustre, earthy taste, no smell.	Vegetable debris, amorphous matter, linen and cotton fibre, house refuse, Scaly Epithelium, and numberless Bacteria.	Black deposit	Large	Present
30	Fermoy	No. 3 Well, Old Barracks.	Slightly yellow, clear, good lustre and taste, small sediment, no smell.	Crystals of carbonate of lime, no trace of animal or vegetable life.	No reaction	Small	Trace
31	Fermoy	No. 4 Well, New Barracks.	Slight turbidity, small sediment, good lustre and taste, no smell.	Cyclops Quadricornis, Canthocamptus Minutus, Monostyla, Rotifer Vulgaris, dead Acaerus, numerous minute Amæbæ, vegetable debris, Foraminifera, Fungi, and grit.	Black deposit	Present	Present
33	Fermoy	No. 5 Well, New Barracks.	Slight yellow, some turbidity, fair lustre, good taste, no smell, very large sediment.	Dyed wool and cotton, Cyclops Quadricornis alive and dead, coal dust sweepings, vegetable debris.	Black deposit	Present	Trace
33	Fort George, Scotland.	Fort George, S.E. corner.	Slightly yellow, no turbidity, small sediment, good lustre and taste, no smell.	Organic debris, with minute mineral particles, cotton fibre and pine cells, Bacteria in the Zooglaea form, and fungus spores were present.	Slight pink reaction.	Present	Trace
34	Fort George	Loch Flemington, near Fort George.	Yellow, no turbidity, large sediment, good lustre and taste, no smell.	Amorphous matter and spores of fungi, Desmids, as Pediatrum, Oxytricha, and Monadina among Infusoria, large Diffugia, Eucevia of Entomostrica, Cyclops, and minute water fleas.	Black deposit	Present	None
35	Fort George	Well on W.D. boundary, Fort George.	Slightly yellow, no turbidity, small sediment, good lustre and taste, no smell.	Amorphous matter, green sand, carbonate of lime, no evidence of animal or vegetable life.	Dark shot pink reaction.	Present	Trace
36	Fort George,	Loch Drummin, about 4 miles from Fort George.	Yellow, no turbidity, small sediment, good lustre and taste, no smell.	Brown vegetable debris with Anthophysa tubes, Fragilaria bands, Tabellaria, Pinnularia, Astrionella, Synedra, Zoospores and Fungus spores, Monadina, Amæbæ, Diffugia, Arcella, Trinema, and Euglypha.	Slight blackening.	Present	None
37	Gibraltar	Sanitary Commissioners Well, No. 2, North Front, 24' deep.	Clear, slightly brackish, very small sediment, no smell, very good lustre.	Deposit quite inappreciable, a cotton fibre, a few chips of pine, and a few minute mineral particles.	No reaction	Very large.	Trace
38	Gibraltar	Sanitary Commissioners Well, No. 2, North Front, 38' deep.	Clear, extremely small sediment, no smell, slight brackish taste, very good lustre.	Nothing appreciable	No reaction	Present	Trace
39	Gosport	Well supplying the Fort, 38' 8" deep.	Colourless, no turbidity, small sediment, taste flat, no smell, lustre good.	Spores of Fungi, worn linen and cotton fibre, wool, silk, pine debris, vegetable refuse, epidermis of grass, minute Amæbæ, Oxytricha lingua, disengaged gonidia of Lichens, Stylonychia, Monas Lens, Euchelya.	No reaction	Present	None

Hardness. Degrees of Clark's Scale.		Chlorine, Grains per Gallon.	Ammonia, Parts per Million.		Solids, Grains per Gallon.		Oxygen required (de- termined by Permanganate of Potassium, Heat, and Sulphuric Acid, Parts per Million).		Nitrous Acid, Parts per Million.	Remarks.	No.
Total.	Fixed.		Free.	Albu- minoid.	Total.	Fixed.	For Total Oxidizable Matter.	For Organic Matter only.			
20.30	7.35	3.3232	None	0.0310	49.3500	41.6500	0.2200	0.1800	0.1150	Fit for use - -	28
21.70	2.45	1.8352	0.5280	0.1984	31.1500	27.6500	1.4200	0.8200	2.1250	Impure, unfit for use	29
24.50	7.00	2.9264	0.0236	None	43.4000	37.8000	0.3800	0.3000	0.2300	Fit for use - -	30
22.75	3.50	2.0336	0.1200	0.1392	36.4000	32.5500	0.5800	0.5000	0.2300	Impure - -	31
23.10	4.20	1.8352	None	0.0912	30.1000	29.4000	1.5800	1.3800	0.6900	Filtration advisable before use.	32
10.50	6.30	5.3072	0.0672	0.1008	31.1150	24.0450	1.0600	0.9000	0.4600	Unfit for use without careful filtration.	33
4.55	3.50	1.3392	0.0512	0.2404	13.6500	8.8250	2.9000	2.9000	None	Fit for use after filtra- tion.	34
8.75	6.65	1.9344	0.1536	0.2192	22.7500	21.4000	1.6200	0.9000	2.0125	Unfit for use - -	35
5.60	2.10	1.4384	None	0.1584	23.1000	19.6000	2.0200	1.8600	0.4600	Probably fit after care- ful filtration.	36
16.80	13.30	37.0512	None	0.1310	100.2000	88.9000	0.3400	0.3000	0.1150	Contamination with sea water.	37
55.30	37.80	104.1600	None	None	236.8100	196.5600	0.8600	0.8600	None	Organically pure, but contaminated with sea water.	38
7.52	0.30	2.8272	0.7480	None	25.9000	22.4000	0.3800	0.3400	0.1150	Impure - - -	39



No.	Station.	Source.	Physical Characters.	Microscopic Characters.	Qualitative Tests.		
					Gold Chloride.	Nitric Acid.	Iron.
40	Gosport	North Well, inside Fort.	Yellowish, no turbidity, good lustre and taste, some sediment, no smell.	Spores of Fungi and vegetable debris, dyed wool, worn linen fibre, pine detritus, Monostyla Quadridentata, Cyclostella, solitary Vorticella, Monas, Peridinium, gonidia of Lichens.	Slight black deposit.	Large	None
41	Gravesend	Tilbury Fort, from Railway Station.	Whitish, slight turbidity, small sediment, no lustre, taste of tar, tarry smell.	Spores and mycelium of Fungi in small quantity.	Black deposit.	Present	Present
42	Gravesend	Artesian Well at Low Street, 2½ miles from Fort.	Clear, very small sediment, taste and smell of tar.	A little vegetable debris, but no trace of animal or vegetable life.	Slight shot pink.	Present	Trace
43	Hampton Court.	Tap outside Officers' quarters, from Longford River.	Straw colour, suspended matter small, lustre and taste good, very little sediment.	Amorphous matter, mycelium and spores of Fungi, no trace of animal or vegetable life.	Slight black deposit.	Trace	Present
44	Kinsale	No. 1 Tank (rain-water).	Clear, very little suspended matter, no turbidity, flat taste, no smell.	A little amorphous matter and a few threads of mycelium.	No reaction	Trace	Trace
45	Kinsale	No. 2 Tank (rain-water).	Clear, no turbidity, very small sediment, good lustre and taste, no smell.	Inappreciable sediment	No reaction	Present	Trace
46	Kinsale	Officers' Mess Tank.	Whitish colour, no smell, very good lustre and taste, very small sediment.	Amorphous matter, a few minute Amæbæ and one Anguillula.	No reaction	Present	Trace
47	Kinsale	No. 2 Tank (rain-water).	Slightly yellow, no turbidity, small sediment, good lustre and taste, no smell.	Inappreciable	No reaction	Trace	None
48	Londonderry	Ebington Barracks, No. 1 Well.	Clear, no sediment, very good lustre and taste, no smell.	A few particles of mineral grit.	Slight blackening.	Present	Trace
49	Londonderry	Ebington Barracks, No. 2 Well.	Clear, extremely small sediment, very good lustre and taste, no smell.	A little mineral grit	Slight shot pink.	Trace	Trace
50	Monaghan	Well, 60' deep	Clear, no turbidity, good lustre and taste, no smell.	Amorphous matter, vegetable debris, very small Ciliata and Monadina.	Slight shot pink.	Present	Trace
51	Moncton Fort	Well inside Fort.	Slightly yellow, no turbidity, some sediment, very good lustre and taste, no smell.	Amorphous matter, dyed wool, red and blue, solitary Vorticella, Stylonychia, Monostyla, Euplotes, Acanthocystis, Trinema Acinus, minute Oscillatorians, Bacteria in a free and active state.	Black deposit	Present	Trace
52	Parkhurst	Water passed through Crease's filter.	Slightly whitish and turbid, small sediment, no lustre, fair taste no smell.	No appreciable matter	Slight reaction.	Present	Present
53	Parkhurst	Sample from reservoir.	Slightly yellow, slight turbidity, lustre fair, taste flat, no smell.	Mineral grit, exuviae of Entosmostraca, woollen and cotton fibre, spores and mycelium of Fungi.	Black deposit	Present	Trace

Hardness. — Degrees of Clark's Scale.		Chlorine, Grains per Gallon.	Ammonia, Parts per Million.		Solids, Grains per Gallon.		Oxygen required (de- termined by Permanganate of Potassium, Heat, and Sulphuric Acid, Parts per Million).		Nitrous Acid, Parts per Million.	Remarks.	No.
Total.	Fixed.		Free.	Albu- minoid.	Total.	Fixed.	For Total Oxidizable Matter.	For Organic Matter only.			
6°30	4°55	3°0256	0°0572	0°1380	20°5100	15°7500	1°2200	1°1400	0°2300	Impure - - -	40
18°20	7°70	4°4144	0°2056	0°4032	44°7250	40°0750	1°6200	1°5400	0°2300	Unfit for use - - -	41
23°10	8°75	4°3152	0°0508	0°1072	38°6400	32°5500	1°1400	0°8600	None	Unfit for use on ac- count of the strong taste of tar.	42
11°37	2°97	0°8924	None	0°1550	21°1400	20°6150	0°7000	0°6200	0°2500	Usable after filtration.	43
3°15	2°10	1°5376	0°4464	0°1120	13°0550	10°7100	0°5000	0°4600	0°1150	Unfit for use - - -	44
3°32	2°97	1°1408	None	0°1136	8°8200	7°2450	1°0600	0°2200	2°3000	Improved. The large amount of nitrous acid suggests the continued presence of source of contami- nation.	45
10°15	7°70	2°7208	None	0°1040	31°5000	25°2000	0°3000	0°1800	0°3450	Usable - - -	46
2°80	1°57	0°8432	None	None	8°2250	7°7000	0°9000	0°6200	0°8050	Fit for use - - -	47
9°10	3°85	1°9344	0°0864	0°1248	18°9000	17°8500	0°5000	0°4200	0°2300	Impure. Well requires cleaning out.	48
5°60	4°55	1°6368	None	0°0870	13°3000	12°2500	0°2200	0°1800	0°4025	Fit for use - - -	49
17°50	4°55	1°8352	None	None	27°6500	23°2500	0°5400	0°4600	0°2300	Fit for use - - -	50
8°92	1°05	2°7472	0°1792	0°0656	23°1000	22°0500	2°2600	1°4600	2°3000	Unfit for use - - -	51
6°30	2°60	2°3312	0°1512	0°2228	17°1500	15°7500	0°2200	0°2200	None	Unfit for use - - -	52
4°20	3°32	2°6288	0°0979	0°3500	16°2750	12°0750	2°0600	1°9800	0°2300	Unfit for use - - -	53

No.	Station.	Source.	Physical Characters.	Microscopic Characters.	Qualitative Tests.		
					Gold Chloride.	Nitric Acid.	Iron.
54	Parkhurst	Land service filter near canteen.	White, turbid, sediment small, fair lustre and taste, no smell.	Monadina, Cutaneous epithelium, Oxytricha Gibba, minute Desmid, and Oscillatorians in large numbers.	No reaction	Present	Trace
55	Parkhurst	Taken from Crease's filter.	Slight turbidity, very small sediment, good lustre and taste, no smell.	A few fine Oscillatorians and two Vorticellæ, a few particles of lime and grit.	No reaction	Trace	None
56	Sandgate	Cheriton Cliff Villa.	Yellow, not turbid, small sediment, fair lustre, no smell.	Amorphous matter, mycelium and spores of Fungi, Amæbæ, Paramecia.	Black deposit	Large	Present
57	Sheerness	Well, 806' deep	Clear, no turbidity, very small sediment, good lustre and taste, no smell.	Mineral grit, sand, and carbonate of lime.	No reaction	Trace	Trace
58	Shoeburyness	Well, 430' deep	Clear, no turbidity, good lustre and taste, no smell.	A few worn and cotton fibres, and some mineral grit.	Slight black deposit.	Trace	Trace
59	Shrewsbury	Capthorn Road	Whitish, not turbid, fair lustre and taste, no smell.	One or two green vegetable cells, mycelium and spores of Fungi.	No reaction	Trace	Trace
60	Shrewsbury	Well in Shelton Road, depth 26'.	Clear, no turbidity, small sediment, good lustre and taste, no smell.	Vegetable debris, with mycelium and spores of Fungi, a few minute Oscillatorians.	No reaction	Present	Trace
61	Shrewsbury	Shelton Vicarage well.	Clear, no smell, not turbid, good lustre and taste.	A little vegetable debris	No reaction	Trace	None
62	Shrewsbury	Brickstone Asylum Well.	Clear and good in every respect.	A little vegetable debris and mineral grit.	Very slight reaction.	Trace	None
63	Spithead	Spithead Forts	Clear, not turbid, very large sediment, good lustre and taste, no smell.	Total absence of animal life, particles of green sand, and a few crystalline particles.	No reaction	Trace	None
64	Tipperary	A. Block Barracks, Well, 62' deep	Whitish, not turbid, small sediment, fair taste, no smell.	Mineral grit, Actinophrys Sol, and a few Diatoms and Oscillatorians.	No reaction	Present	Trace
65	Upnor	Well, 40' deep	Slightly yellow, no turbidity, small sediment, very good lustre and taste, no smell.	Decaying wood and other vegetable debris, Confervæ cells with Endochrome discharged, minute Ciliata, and minute Amæbæ.	Slight shot pink reaction.	Present	None

Hardness. Degrees of Clark's Scale.		Chlorine, Grains per Gallon.	Ammonia, parts per Million.		Solids, Grains per Gallon.		Oxygen required (de- termined by Permanganate of Potassium, Heat, and Sulphuric Acid, and parts per Million).		Nitrous Acid, Parts per Million.	Remarks	No.
Total.	Fixed.		Free.	Albu- minoid.	Total.	Fixed.	For Total Oxidizable Matter.	For Organic Matter only.			
8.40	5.25	2.7280	None	0.1856	18.6550	16.5550	0.4200	0.3800	0.1150	Fit after filtration	54
6.82	4.45	1.7360	None	None	23.6250	20.8250	0.2600	0.1800	0.2300	Fit for use	55
18.90	10.50	9.4736	None	0.2660	54.1000	40.6000	1.6600	1.4200	0.8050	Unfit for use	56
6.30	1.40	8.9776	None	None	42.7000	41.6500	0.4200	0.4200	None	Fit for use	57
14.70	4.20	22.4192	None	0.1242	87.5500	85.2250	0.6200	0.6200	None	Usable	58
14.00	9.80	3.2240	None	None	37.4500	33.9500	0.3000	0.3000	None	Fit for use. Rather hard.	59
20.60	6.30	1.1408	None	0.0828	27.6500	26.5500	0.7000	0.6600	0.2875	Fit for use	60
26.60	9.10	1.8352	None	None	30.1000	26.9500	0.4600	0.3000	0.2875	Fit for use. Rather hard.	61
21.00	5.60	1.7360	None	None	29.0500	26.9500	0.1800	0.1400	0.1150	Fit for use	62
3.85	1.75	3.8912	0.5423	None	29.5050	27.5800	0.3800	0.3000	0.2300	Fit for use	63
19.60	4.55	1.2400	None	0.1072	31.3250	28.3500	0.5400	0.5400	None	Usable	64
54.25	36.75	66.8112	0.0358	0.1200	161.8400	159.5400	1.0600	0.7000	0.8625	Unfit on account of excessive hardness.	65

On the question of construction of "collective dwellings" for men and animals, M. Tollet, civil engineer, has written some important memoirs, as, for example, one presented to the Académie des Sciences in 1876, and reported on in the Comptes Rendus of February 21st of that year, "Sur les principes qui doivent présider à la construction des logements collectifs (hommes et animaux)." Another was presented this year to the Congrès d'Hygiène at Paris. The views of M. Tollet are well known, and may be briefly stated as follows (as regards hospitals) :—

1. Excessive agglomeration to be avoided by having only a moderate number of beds.
2. Crowding ought to be avoided as much as possible, a minimum total area ought to be given per head with reference to the total ground occupied. This is accomplished by having pavilions of one storey only, and spreading well over the ground.
3. Each pavilion to contain a moderate number of beds.
4. A minimum floor space in the ward or dormitory.
5. A minimum cubic space.
6. A rounding off of all angles in the rooms.
7. Sufficient lighting surface.
8. A sufficient renewal of air to be insured by the architectural form and system of construction.
9. Sufficient warming when required.
10. Separate pavilions for kitchens, offices, &c.

These are the principles which in the main guide our construction in this country, except the limiting of the pavilions to one storey; with regard to the total area per bed, he fixes the minimum at 100 metres=(1,076 square feet), although in the model hospital for 350 beds, shown at the exhibition, the space is 114=(1,227 square feet). This, however, he shows to be more than the average given in the great hospitals of Paris:—

Saint-Louis, 800 beds	112 square metres per bed	=1,205 square feet.
Cochin, 110 beds	- 177     "     "	=1,905     "
Midi, 336 beds	- 80     "     "	= 861     "
Ste. Eugénie -	- 75     "     "	= 807     "
Beaujon -	- 62     "     "	= 667     "
Necker -	- 60     "     "	= 646     "
Lourcine -	- 46     "     "	= 495     "
La Charité -	- 30     "     "	= 333     "
Hôtel-Dieu -	- 28     "     "	= 311     "
La Pitié -	- 20     "     "	= 215     "

He estimates the total area of Paris per inhabitant to be 40 square metres, or 430 square feet, whilst that of London is double. In addition to this, of course, large hospitals of several storeys agglomerate their patients on only one portion of their total area. He further insists upon a very important point, viz., the preservation of a sanitary zone, which should not be encroached upon. The removal also of all hospitals to the suburbs would be an immense advantage to all the community, whilst the price to be obtained for the ground occupied by them would more than pay for the cost of transfer, and would indeed leave a wide margin for extension of accommodation. I am unable at this time to give the proportional area occupied by the chief hospitals in this country, but in some cases it would be very small. Thus, the borough of Salford is about to extend its accommodation for infectious diseases, and it is proposed to make accommodation for 200 beds on a ground of about three quarters of an acre, or about 3,000 square metres. This would give only 15 square metres or 161 square feet per bed, and there is no "sanitary zone." Of course it is unlikely that all the beds should be occupied at once, but according to M. Tollet's minimum the ground ought not to be occupied by more than 30 patients instead of 200.

M. Tollet recommends hospitals of about 350 beds, each pavilion to have 30 beds, the floor space in the wards to be 10 square metres, or 108 square feet, the cubic space 60 cubic metres, or 2,118 cubic feet, which space is to be changed at least twice in the hour, giving 4,236 cubic feet per hour. These requirements involve wards 20 feet (6 metres) high, too great a height, I think, for practical purposes, considering the difficulty of warming. In addition to the above he urges the use of incombustible materials, concrete impermeable base-

ments, impermeable floors and walls, and the Gothic form of architecture, which he looks upon as the best adapted for ventilation purposes, and hints that the substitution of this for the round arch in the middle ages was as much with a view to *aération* as to architectural beauty.

A further point insisted upon is extreme cleanliness of rooms or wards, their approaches and their occupants, as well as *intermittence* of occupation. On the question of cleanliness there can be no doubt that this is of the very highest importance in a hospital, and that without the most unremitting attention and scrupulous cleanliness no perfection of construction will avail to keep a hospital healthy. A good instance of the paramount influence such cleanliness exercises over the health of a hospital has been shown in connexion with the Norwich Infirmary, which formerly was constantly afflicted with pyæmia to such an extent that it was determined to reconstruct the building. About three years ago, however, a change was made in its administration, and a matron appointed who brought the most energetic and unremitting attention to every detail, especially as regards the cleanliness of everything. The result has been that since she entered the place not a single case of pyæmia has been known.

In contradistinction to the principles of M. Tollet (who has, however, been able to carry out his plans at Bourges and elsewhere) have been the plans on which the large new hospital at Ménilmontant, in the north-east of Paris, has been constructed. This is emphatically a monumental hospital, of great height, and for a great number of patients. The area per bed is about 83 square metres or 882 square feet, the total number of beds being 635, with possibilities of extension in cases of epidemics. The space per bed is stated at 54 cubic metres or about 1,880 cubic feet, but as the wards are lofty, the floor space will not much exceed 100 square feet. There are separate buildings for small-pox and for maternity cases, but the arrangements did not strike me as satisfactory. The notion that the whole conveyed was that the large sum of money might have been laid out to much better advantage, by using a simpler form of construction, and by paying less attention to external appearance. Various internal details also appeared to be on an unnecessary scale, in particular the immense space devoted to the pharmaceutical arrangements and staff. Indeed the proportions to which the pharmacy department is allowed to extend and the influence accorded to it in France, both in civil and military establishments, is very remarkable, and in many ways undesirable; in the army especially, where the *pharmaciens* rank *pari passu* with the medical officers proper, their position, number, and influence appear to be wholly disproportionate to their value or importance. The expense of the Ménilmontant Hospital is stated at 10,000,000 francs (400,000*l.*), or about 635*l.* a bed, nearly 50 per cent. greater than that of the Herbert Hospital, which is still (for its size) without an equal. It is much to be feared that Ménilmontant will not prove more satisfactory than Lariboisière or the new Hôtel-Dieu, which has, since occupation, only too well justified the forebodings of many who visited it beforehand, whilst its expense has been something perfectly unprecedented, being stated at something like four times even that of Ménilmontant.

In marked contrast to the above *inordinate* buildings is the now celebrated pavilion of M. Tarnier, erected in the garden of the old *Maternité* at Paris, which has been more than once described. It is a two storied building, surrounded by a verandah, traversed by a central passage from front to rear, which serves as kitchen, office, &c., on each floor. The wards are separate rooms, having no connexion with each other or with the central passage, except by windows, glazed but completely closed to the latter. Each ward (of which there are four on each floor) is entered from the open air by its own door and is occupied by one patient only, the cubic space being about 56 metres or 2,000 cubic feet. The floor is made of impervious material, several substances having been tried, but preference being given to *dalles* or stone flags. The bedsteads are iron with a spring bottom, the springs being at head and foot. Instead of waterproof sheets for dressing purposes, waterproof paper is employed, which being very inexpensive is destroyed after being once used. The results obtained have been most satisfactory, according to the information given to me by M. Tarnier. Two points however might be mentioned:—1st. That as a model hospital it would be better to have it a one-storied pavilion. 2nd. That there is no provision whatsoever for ventilation when the window is shut, so that in the majority of instances there will be at night but little

renewal of air. This is a very serious blot which should be removed. One circumstance shown to me was very instructive, and bears upon what has been said above as to the necessity for the most scrupulous attention to every detail. Ophthalmia has prevailed very constantly and severely among the new-born children in the main building, and in order to prevent its spread to the pavilion precautions have been taken to have a distinct staff for the latter, and the physician and his interne always visit it first before seeing the patients in the main building. Yet a case of ophthalmia broke out in the pavilion. In conversation, it was mentioned that the washing of the linen was done in the main building for both places, and it seems likely, in the absence of proof to the contrary, that to this must be attributed that unfortunate attack. Still it must be admitted that, with its defects, the principle of the pavilion is a sound one, and its extension, modified by further experience, much to be desired.\*

Amongst other publications on this question, I may mention :—

Stolpe and Kumlien, "Projet de Casernes pour l'Armée suédoise," Stockholm, 1876.

Chassagne, "Hygiène hospitalière." Paris, 1878.

Colet, "La Réforme du Casernement." Paris, 1878.

Bosc, "Aérage et assainissement des Grandes Villes." Paris.

Lawson Tait, "Hospital Mortality." Churchills.

Wazon, "Ventilation et Chauffage." Paris, Lacroix.

3. *Food and beverages.*—In the last year's report I gave an account of some experiments on bread, in which the determination of the *fat* was wanting. I have since determined it in similar samples, and find it to be about 1·8 per cent. as a mean; this is a little above the amount usually given (1·5), but I think it is accurate, as it was repeated several times with every precaution. The plan employed was that invented by Gerber of Zürich, a much better method than that previously used. It consists in putting a weighed quantity of the material for examination, previously dried in the air-bath, into a filter of Swedish paper; this is placed in a small glass funnel with a ground end, which fits accurately into the mouth of a thin glass bottle previously weighed. Into the bottle is placed a little sulphuric ether, about two-fifths full. The funnel, which has a lip, is now connected by means of a single tubed india-rubber cap with a long perpendicular tube, open at the top, and enclosed in a Liebig's condenser, through which cold water is kept flowing. The bottle is placed in an evaporating dish with ordinary water, which is heated by means of the gas or a spirit lamp. The ether soon boils and passes up through the powder in the filter; as it rises, it is condensed in the tube, flows back through the powder, and carries the fat with it into the bottle, the fat of course remains, whilst the ether continues its circulation. Beyond seeing that there is a plentiful supply of water, the apparatus requires no watching, and may be left to itself until all the fat is extracted. When it is finished, the bottle is removed from the funnel and the heat continued until the ether is all evaporated. The bottle is then dried, cooled, and weighed and the amount of fat determined.

A sample of bread was sent from Germany for report, and the following is the analysis of it :—

#### ANALYSIS of a SAMPLE of BREAD made by HERR DAÜMICH.

The sample sent formed part of a loaf; it was very dark coloured, particularly the crust, very close, and had the smell of rye bread. The sample appears to have been made about three weeks.

##### *Analysis of the Crust :*

Water	-	-	-	-	-	14·7340
Albuminates	-	-	-	-	-	8·5960
Fat	-	-	-	-	-	6·2500
Carbo-hydrates	-	-	-	-	-	69·0340
Ash	-	-	-	-	-	1·3860
						<hr/> 100·0000

\* Since this was written a "Circular" system of Hospital Wards has been recommended by Mr. John Marshall, F.R.S., in a paper read at Cheltenham before the National Association for the Promotion of Social Science.

*Analysis of the Crumb :*

Water	-	-	-	-	-	34·6800
Albuminates	-	-	-	-	-	7·5600
Fat	-	-	-	-	-	3·9200
Carbo-hydrates	-	-	-	-	-	52·5400
Ash	-	-	-	-	-	1·3000
						<hr/> 100·0000

*Mean Analysis of the Bread :*

Water	-	-	-	-	-	30·0350
Albuminates	-	-	-	-	-	7·8250
Fat	-	-	-	-	-	4·4400
Carbo-hydrates	-	-	-	-	-	53·6300
Sugar	-	-	-	-	-	2·6700
Ash	-	-	-	-	-	1·4000
						<hr/> 100·0000

Microscopic examination shows the presence of rye flour, with no conclusive evidence of the admixture of other starches.

The points claimed for this bread are; its greater amount of fat and its keeping qualities, as it can be kept for weeks without getting hard or mouldy. The crust, however, is very soft, and it is probable that the taste would soon pall on the palate,—as it is nearly all rye, which does not agree with every one. It is quite true, however, that the fat is in large quantity, about 2½ times the amount found in the best wheaten bread. The introduction of a little sugar is a doubtful improvement.

*Concentrated Food.*—A great many foods of this kind are in the market, some of the nature of the well-known "Erbswurst," others slightly modified, such as the so-called "German Army Food."

The following is a detailed report upon some recent samples of Erbswurst which I examined lately:—

REPORT ON SAMPLES of "ERBSWURST" received from the War Office,  
May 7, 1878.

Two samples, numbered respectively 1 and 2, were received. Both appeared to be portions of sausages about 5 centimetres in diameter (about 2 inches), covered with oiled paper.

No. 1.—Colour, rather a dirty yellow; smell, strongly leguminous; tastes like cold pease-pudding with the addition of fat; boiled for a short time with water it makes a very palatable soup. Under the microscope the chief objects were starch cells of pea or bean and leguminous cellulose. There were also a few large spherical cells not distinguishable from rye; these were, however, of probable leguminous origin.

*Quantitative Analysis.*

Water	-	-	5·830	per cent.
Fat	-	-	35·616	"
Nitrogen	-	2·435		
Albuminates	-	-	15·342	"
Carbo-hydrates	-	-	37·402	" (by difference).
Salts (ash)	-	-	5·810	" (by incineration).
Total	-	-	100·000	

The ash contained 1·82 of sodium chloride and 1·1015 alkalinity, reckoned as soda ( $\text{Na}_2\text{O}$ ). This argues a probable amount of vegetable acid, reckoned as citric acid, of 2·2174.

One ounce, gross weight, would contain—

Fat	-	-	0·356	ounce	=	158	grains.
Albuminates	-	-	0·153	"	=	67	"
Carbo-hydrates	-	-	0·374	"	=	164	"
Salts	-	-	0·058	"	=	25	"



Of ultimate elements it would contain—

Nitrogen	-	-	-	-	10·7 grains.
Carbon	-	-	-	-	232·0 „

The carbon is thus distributed :—

Albuminates	-	-	-	-	36 grains.
Fat	-	-	-	-	123 „
Carbo-hydrates	-	-	-	-	73 „
Total	-	-	-	-	<u>232</u> „

N : C :: 1 : 22.

No. 2.—This sample is of a deeper yellow colour and has a stronger flavour than No. 1; it makes a very palatable soup. Under the microscope it shows leguminous structures chiefly; a few fragments of muscular fibre and a little condiment (?).

One peculiarity is the darker colour of the fat, probably due to a different kind of fat being used; perhaps pork or mutton fat in the one case and beef suet in the other.

*Quantitative Analysis.*

Water	-	-	3·650 per cent.	
Fat	-	-	35·154 „	
Nitrogen	-	2·537		
Albuminates	-	15·983	„	
Carbo-hydrates	-	37·532	„	(by difference).
Salts (ash)	-	7·681	„	(by incineration).
Total	-	<u>100·000</u>		

The ash contained 3·34 grains of sodium chloride, and 1·117 alkalinity reckoned as soda ( $\text{Na}_2\text{O}$ ), showing probable vegetable acidity as citric acid equal to 2·415.

One ounce, gross weight, would contain—

Fat	-	-	0·351 =	153 grains.
Albuminates	-	-	0·160 =	69 „
Carbo-hydrates	-	-	0·375 =	163 „
Salts	-	-	0·077 =	34 „

The ultimate elements are—

Nitrogen	-	-	11 grains.	Ratio of N to C.
Carbon	-	-	231 „	1 : 21

The carbon is thus distributed :—

Albuminates	-	-	-	37 grains.
Fat	-	-	-	121 „
Carbo-hydrates	-	-	-	73 „
Total	-	-	-	<u>231</u> „

The composition of the two samples is thus almost identical, so that practically they may be considered the same.

The potential energy of each is as follows :—

	No. 1.	No. 2.
Albuminates	26·7	28·0 foot-tons.
Fat	135·0	133·0 „
Carbo-hydrates	49·0	50·5 „
Total	<u>210·7</u>	<u>211·5</u>

The composition of the above is much the same as that of the "pea-sausage," examined and reported upon by the late Dr. Parkes some years ago (see "Manual of Practical Hygiene," 5th edition, page 275).

*Remarks.*

This article contains the elements necessary for nutrition, although, perhaps, not in the best form. The practical experience in the Franco-German war seems to have been that it was relished for a time, but that men got tired of it and that it produced dyspepsia. This is what might have been expected from a diet containing so much fat, and with all the albuminate and carbo-hydrate of leguminous origin. For cases of emergency, however, such as forced marches, outposts, sieges, and the like, it would be a valuable article.

The following would be the rations required per head:—

If given alone:—

24½ ounces.

This would give:—

Fat	-	-	-	-	8.7 ounces.
Albuminates	-	-	-	-	3.7 "
Carbo-hydrates	-	-	-	-	9.1 "
Salts	-	-	-	-	1.4 "
Water-free food					<u>22.9</u> "

Here the albuminates are too low and the fat too high.

The nitrogen and carbon would be—

Nitrogen	-	-	-	-	255 grains.
Carbon	-	-	-	-	5,700 "

N : C :: 1 : 22.

This is too little nitrogen for a long continuance.

If bread be given along with it, then the quantities might be:—

Erbswurst	-	-	-	-	12 ounces.
Bread	-	-	-	-	24 "

Total - 36

Fat	-	-	4.66	Nitrogen	-	256 grains.
Albuminates	-	-	3.72	Carbon	-	5,610 "
Carbo-hydrates	-	-	16.00	N : C :: 1 : 22.		
Salts	-	-	1.02			

Total water-free food - 25.40

This is still too little nitrogen, but the difficulty is to deal with such an article so as to give enough of nitrogen without loading the stomach with fat. There is too much fat in the diet and it might be very advantageously lessened.

Another article I have examined is more in the form of solidified pea-soup, each ration enclosed in a cylindrical tin envelope:

Gross weight	-	-	grammes.	ounces.
Weight of tin envelope	-	-	89.100	= 3.17
	-	-	16.840	= 0.60
Weight of net ration	-	-	<u>72.260</u>	= <u>2.57</u>

*Quantitative Analysis.*

Water	-	5.013 per cent.	
Fat	-	21.986 "	
Albuminates	-	17.319 "	Nitrogen - 2.74 per cent.
Carbo-hydrates	-	53.473 "	
Ash	-	2.209 "	
Total	-	<u>100.000</u>	

These proportions are better than those of the Erbswurst.

N 2

Each ration would contain :				ounces.	
Fat	-	-	-	0·485	= 212 grains.
Albuminates	-	-	-	0·386	= 168 "
Carbo-hydrates	-	-	-	1·190	= 520 "
Salts	-	-	-	0·049	= 21 "
Water free -				2·100	= 921 "

The proportions of nitrogen and carbon are—					
Nitrogen	-	-	-	-	27 grains.
Carbon	-	-	-	-	487 "

The carbon is thus distributed :—					
Albuminates	-	-	-	-	89 grains.
Fat	-	-	-	-	168 "
Carbo-hydrates	-	-	-	-	230 "
Total				-	487

N : C :: 1 : 18.

The proportions per ounce, to compare with the Erbswurst, are—

				ounce.	grains.
Fat	-	-	-	0·190	- 83
Albuminates	-	-	-	0·150	- 65
Carbo-hydrates	-	-	-	0·461	- 206
Salts	-	-	-	0·019	- 8
Total				0·820	- 362
Nitrogen				-	10·4 grains.
Carbon				-	190·0 "

12 rations would give 320 grains of nitrogen, and 5,844 of carbon, rather disproportionate but better than the Erbswurst.

Another form of food is the "German Army Food," patented by Behr, Tweedie, & Co., and said to have been adopted in Germany and elsewhere. It differs in form and appearance from the others, consisting, as it does, of a powder contained in a small canvas bag, with an additional piece of fat in a gelatine cover. This fat may be added or not according to taste. The ration is ordered to be boiled for 15 minutes in water, and it makes a palatable soup. Practically I found that more than 15 minutes were required to cook it thoroughly. The powder consists of meat, flour, and vegetables, dried together and reduced to powder. The following are the weights :—

	grammes.	ozs. grs.	ounces and tenths.
Total gross weight	116·000	= 4 60	= 4·09
Weight of bag	4·316	= 0 66	= 0·15
Weight of fat and gelatine cover	6·490	= 0 100	= 0·23
Gelatine cover	0·395	= 0 6	= 0·01
Net weight of fat	6·005	= 0 94	= 0·22
Net weight of ration less fat and bag	103·770	= 3 289	= 3·660
Total ration including fat	109·775	= 3 383	= 3·876
Total ration including fat with gelatine cover	110·170	= 3 385	= 3·880

Quantitative analysis per cent.—

Ration (without the extra fat)				do (with the extra fat).			
Water	-	12·200	-	-	-	11·595	
Fat	-	6·227	-	-	-	11·500	
Albuminates	-	30·926	-	-	-	28·250	
Carbo-hydrates	-	44·836	-	-	-	43·155	
Salts	-	5·811	-	-	-	5·500	
Total				-	-	100·000	

*In Ash :*

Sodium chloride	-	-	-	3.60 per cent.
Alkalinity (reckoned as soda)	-	-	-	0.23 „

*Nitrogen :*

In dried powder	-	-	-	5.591 per cent.
In normal powder	-	-	-	4.909 „
In total ration including fat	-	-	-	4.637 „

*Actual amounts in Ration :*

			grammes.	ounces.	In one ounce.
Water	-	-	12.600	= 0.444	0.115
Fat (in the powder)	6.462	=	0.227		
Fat, extra	6.005	=	0.212		
Total fat	-	-	12.467	= 0.439	0.114
Albuminates	-	-	31.000	= 1.100	0.286
Carbo-hydrates	-	-	47.708	= 1.683	0.440
Salts	-	-	6.000	= 0.210	0.055
Total ration	-	-	109.775	= 3.876	1.000

	grammes.	grains.	grains.
Nitrogen	4.9	76.	19.6

*Carbon :*

In albuminates	-	-	18.6	256	66
In fat	-	-	9.9	152	39
In carbo-hydrates	-	-	21.3	325	85
			49.8	733	190

N : C :: 1 : 10

This gives a very high proportion of nitrogen, but with the addition of bread or biscuit it would be an excellent ration. *Four* rations and a pound of bread would make a good and substantial daily allowance, giving about 390 grains of nitrogen (=25.4 grammes) and 4,836 grains of carbon (=312 grammes).

There are two objections to the ration, viz.: 1. That the drying appears to have been carried a little farther than is advisable, rendering the complete softening of the albuminates difficult when cooked; and 2nd. The form of the ration, a powder in a canvas bag, seems to expose it to the risk of deterioration from damp or wet.

*Beverages.*

*a. Alcoholic.*—It is frequently stated that the spirits supplied to soldiers are drugged, especially on foreign stations. This does not accord with our experience, as the accompanying analysis of a sample of rum from Gibraltar will show. Nothing appears to have been added but water, although that has been added pretty freely. This quite accords with what I found in a number of samples sent home from Malta a good many years ago by Inspector-General Paynter, the principal Medical Officer of the station. The samples included wine as well as spirits (both rum and brandy) and although all had been freely watered nothing else seemed to have been added.

## ANALYSIS of a SAMPLE of RUM sent from GIBRALTAR.

Received a small bottle (about three ounces) of a dark brown liquid having the smell and taste of rum.

Specific gravity of liquid	-	-	= 0.960
„ „ distillate	-	-	= 0.956
„ „ residue	-	-	= 1.004
Per-centage of extract	-	-	= 1.000
„ „ alcohol (vol. in vol.)	-	-	= 31.5000
„ „ „ (weight in vol.)	-	-	= 25.2000

The extract was clear and had the smell and taste of sugar. Treated with liquor potassæ and heat, the smell of sugar only was detected, and only a

trace of ammonia was found when submitted to the action of Nessler's solution on paper. The sample had been diluted with water over 100 per cent., but nothing else appears to have been added.

*b. Non-alcoholic. Tea.*—The accompanying table gives the results of 19 analyses of tea for use in the hospital at Netley, the contract price being 2s. 4d. per lb. The standard contract sample was a fairly good sound tea, although not specially delicate in flavour. With the exception of No. 1 in the list, which was rejected, all the samples were found equal to the contract. The special points about No. 1 sample were its poor flavour and the small per-centage of extract. This might indicate the presence of used leaves, but there were against this, on the other hand, a fair degree of acidity in the infusion, and a fair amount of ash; it was, therefore, in all probability, merely a poor sample.

The mean amount of moisture (in the accepted samples) is a little above 9 per cent. and the variation on the whole not great. The mean extract gives a little over 35 per cent., a fair amount, but with a good deal of variation. The ash gives a little over 6 per cent., without much variation; the other determinations, viz., the acidity of extract and the chlorine and alkalinity of the ash, are very variable. On the whole, tea has still to be judged of as much by flavour as by anything else.

ANALYSES OF SAMPLES OF TEA.

No. of Sample.	Date of Examination.	Flavour.	Per-centage of Moisture.	Per-centage of Dry Tea.	Per-centage of Extract.	Per-centage of Acidity of Extract stated as Oxalic Acid.	Per-centage of Ash.	Per-centage of Chlorine in Ash.	Per-centage of Alkalinity of Ash stated as Soda.	Remarks.
1	1876. Oct. 24	Poor - -	9·4240	90·5760	22·4390	1·9250	6·0250	0·0500	0·4030	Inferior to sample.
2	Oct. 31	Good - -	7·3500	92·6500	27·6000	0·9450	5·9900	0·0923	0·5480	Equal to sample.
3	Nov. 6	Very good	9·5640	90·4360	35·4890	2·1730	5·8360	0·0570	0·4840	" "
4	1877. Feb. 17	" "	10·0800	89·9200	30·7140	2·1870	4·5500	0·0730	0·4150	" "
5	April 3	" "	10·0200	89·9800	32·0000	1·8820	6·1901	0·0860	0·6460	" "
6	April 20	Fair - -	10·2800	89·7200	33·1870	2·3410	6·4500	0·0842	0·6810	" "
7	May 3	Very good	9·9900	90·0100	29·7650	2·1410	5·9800	0·0560	0·3040	" "
8	Aug. 31	" "	8·6220	91·3780	40·1430	1·2230	5·8530	0·0710	0·3180	" "
9	June 7	" "	8·7210	91·2790	31·0600	1·8900	6·9500	0·0850	0·4030	" "
10	July 24	Fair - -	9·3370	90·6630	37·0170	1·9540	5·2500	0·1060	0·1900	" "
11	Oct. 3	Good - -	8·1000	91·9000	41·9000	1·8010	6·3600	0·0710	0·3870	" "
12	Nov. 22	Very good	9·1940	90·8060	38·6440	1·4430	6·4800	0·0560	0·3350	" "
13	1878. Jan. 12	Good - -	8·8300	91·1700	35·6360	1·6000	6·4500	0·0500	0·5164	" "
14	Jan. 29	Very good	8·8000	91·2000	31·7670	1·8770	6·0300	0·0620	0·3174	" "
15	Feb. 11	Good - -	8·9500	91·0500	36·7950	1·3310	6·8500	0·0630	0·2860	" "
16	Mar. 13	Very good	9·0900	90·9060	32·3180	1·5160	6·5200	0·0630	0·2920	" "
17	April 1	" "	9·2620	90·7350	35·3200	1·5560	6·2500	0·0560	0·2250	" "
18	May 6	Good - -	9·0400	90·9600	32·3400	1·2120	5·7400	0·0570	0·2720	" "
19	June 5	Very good	9·1260	90·8740	33·0310	1·5520	6·4800	0·0800	0·3100	" "
Averages (excluding No. 1)			9·1309	90·8691	35·2403	1·7013	6·1194	0·0704	0·3920	

4. *Propagation of Disease by means of Drinking Water.*—The question of the possibility of transmitting malarious poison through drinking water has been much debated. Among other pieces of evidence were the cases recorded as having occurred at Tilbury Fort and recounted in the 17th volume of the Army Medical Reports, p. 212. The evidence there seemed conclusive that the disease was conveyed through the so-called rain-water, which was contaminated with marsh water from soakage through the tanks. Another very important paper\* has been published by Charles Smart, M.B., C.M., of the

\* "On mountain fever and malarious waters," by Charles Smart, M.B., C.M., Captain and Assistant-Surgeon, United States Army. Extracted from the American Journal of the Medical Sciences for January, 1878.

United States Army, on mountain fever and malarious waters. The following is the substance of his remarks. In the rocky mountain regions of North America there prevails a fever to which the *vox populi* has attached the name of *mountain fever*. Much confusion has hitherto prevailed as to its nature. In the days of the pioneers and prospectors of the western country it was more common and deadly than it is now, and very severe cases occurred among the emigrants and settlers on their way to California and the Mormon settlements (Dr. Williamson, in the discussion on mountain fever, Salt Lake Medical Society, March 12th, 1877). It used to be treated at first, professionally with mercury, by the laity with the time-honoured "sage-tea." The following early notices of it are cited:—1851, Dr. C. E. Boyle published an article, Ohio Medical and Surgical Journal, III., p. 528-30; St. Louis Medical Journal, IX., pp. 454-6; Dr. J. E. Oatman, North-Western Medical and Surgical Journal, VIII., pp. 105-8; and Boston Medical and Surgical Journal, XLIV., pp. 511-12; Dr. Ewing, St. Louis Medical Journal, XIII., pp. 109-16.

In 1865, Dr. F. Rice Waggoner wrote, in the July number of the American Journal of the Medical Sciences, on the mountain or continued miasmatic fever of the Colorado Territory. He was first taught by his pioneer brethren that it was a modification of typhoid or enteric fever, but he shows it to be clearly malarial and insists upon large doses of quinia, 65 to 70 grains *per diem*, in divided doses.

Surgeon E. P. Vulliamy, U.S.A. (Report on Hygiene of the U.S. Army, 1875), writes that it is epidemic every 10 years, the last invasion occurring in the fall and winter of 1871-72. This statement is not borne out by the undertakers' books.

Dr. A. J. Hogg speaks of it as a "malarial fever, very amenable to treatment." Assistant-Surgeons Patzki and Town speak of it as "malarial remittent," and the general tendency has lately been to show that there is no specific form of disease that is called "mountain" fever, but that the cases are "malarial remittent," with a possibility of typho-malarial or typhoid fevers.

Dr. Smart arrived at Fort Bridger in Wyoming Territory in August 1873. There was nothing malarious in the surroundings of the place, and the temperature went down to 32° F. 10 months out of the 12. As spring advanced cases of mountain fever occurred, with languor, muscular stiffness, depression, complexion sallow, pulse about 100, stiffness about the finger joints; tongue peculiar, having a smooth bluish white film, with or without a yellow fur at the base. Cases occurred most frequently in May, June, and July, but were absent in September and October, yet these last are the months of greatest prevalence of malarious fever in the United States. In 1876, Dr. Smart again observed the disease at Fort Douglas, Utah, and describes it as follows:—

1. A primary stage of one, two, or more weeks, during which the individual is more or less oppressed by the influence of the *materies morbi*.
2. The development of the fever, more or less marked and more or less rapid in its course, with irregular remission and much more depression and muscular prostration than the patient's pulse and temperature would prepare the observer to find.
3. A typhoid stage marked by prostration, emaciation, low delirium, and coma-vigil.

The disease was very amenable to treatment (even in the third stage) to quinia. It was certainly not typhoid (i.e., enteric), for the symptoms during life and the post mortem appearances of that disease were both wanting. It could not be traced to local surroundings or telluric influences. Quinia rapidly cures it, proving its malarial origin; yet malarious diseases soon recover at Fort Steele and Fort Bridger, and no intermittent occurs in the place. Fort Shaw, Montana, is also free from intermittent. Cases of mountain fever occurred when the thermometer was at times below zero and always below the freezing point.

The question then arose, How is the disease caused? Can it be transported by winds, or are there other causes at work?

Whilst stationed at Fort Bridger, Dr. Smart spent several months in examining the various spring, well, and river waters used by the troops in Nebraska, Wyoming, and Utah. The most remarkable point was the large

quantity of undecomposed organic matter of vegetable origin which was contained in all the river waters, even those which are looked upon as pure mountain streams. That the organic matter was vegetable in character was inferred by the absence of sodium chloride, which is the invariable accompaniment of animal matter; that it was recent, or at least in good preservation, by the absence of nitrites, which would have resulted from its decomposition. He used the albuminoid ammonia process for the determinations. The purest rivers he examined showed 0·19, 0·20, and 0·28 per million of albuminoid ammonia. This did not come from the springs, which showed only 0·10. The feeders of the streams were heavy rain-fall and snow. The first heavy snow-fall collected showed twice as much organic matter as the rivers; later falls gave less. At Black's Fork, Douglas Brook, and Lodge-pole Creek, waters reckoned pure yielded as much as 0·28. At Fort Sanders, 0·50. He was informed by an officer on duty at the latter station that certain low fevers were vaguely rumoured as being connected with impurity in the water supply. Dr. Smart concluded at that time that the rules in use in England as to water impurity were inapplicable in America, and that something like the following must be substituted:—

Under 0·30 per million, water wholesome.		
From 0·30 to 0·40	„	suspicious.
„ 0·40 to 0·50	„	dangerous.

The organic taint he considers to consist of vegetable emanations and débris swept up by the winds from the face of the continent and precipitated by cold and moisture along with snow from the higher regions of the atmosphere.

It was only in the following spring that it occurred to him that this impurity was connected with the mountain fever. On referring to his note book he finds the following:—

		Albuminoid Ammonia.
Black's Fork water, June 14, 1875	-	- 0·28 per million.
„ „ July 19, „	-	- 0·24 „
„ „ Aug. 28, „	-	- 0·20 „
„ „ Oct. 12, „	-	- 0·16 „
Ice, melted, stored in ice house Feb. 1875; issued for use and examined Aug. 14, 1875	-	- 0·14 „
Black's Fork water, April 21, 1876	-	- 0·20 „
„ „ May 15, „	-	- 0·28 „

This appeared pretty conclusive as to the origin of the organic impurity. A further series of experiments at Camp Douglas, Utah, gave—

		Free Ammonia.	Albuminoid Ammonia.
1. Snow, large heavy flakes, Nov. 15, 1875	-	0·30 -	- 0·50
2. „ „ „ Nov. 17, „	-	0·30 -	- 0·50
3. „ „ „ Mar. 21, 1876	-	0·10 -	- 0·60
4. „ small, granulated, Oct. 30, „	-	0·32 -	- 0·20
5. „ „ „ Oct. 30, „	-	0·32 -	- 0·22
6. „ flakes, Dec. 22, „	-	0·02 -	- 0·40
7. „ „ Jan. 29, 1877	-	0·04 -	- 0·46
8. „ small flakes, Feb. 3, „	-	0·18 -	- 0·34
9. „ large heavy flakes, Mar. 6, „	-	0·30 -	- 0·58
10. „ fine, granulated, Mar. 8, „	-	0·30 -	- 0·22
11. Sleet, Mar. 31, „	-	0·28 -	- 0·28
12. Rain, Oct. 17, 1876	-	0·20 -	- 0·16
13. „ Mar. 29, 1877	-	0·28 -	- 0·18
14. „ and sleet, April 2, „	-	0·28 -	- 0·22

It will thus be seen that snow-water has an organic impurity of from 0·20 to 0·60, but the average of the great mass of snow, the heavy moist flakes, has

from 0.50 to 0.60; this forms the mass of the lying snow; the fine crystalline snow is only in small quantity. The average contamination of snow-water may be taken at 0.45, of the purest streams at 0.14. It is probable that malarious poison may be swept up with the organic matter and precipitated by the snow. Dr. Smart proposes to take the organic matter as a measure of the malarious poison in water, just as the carbonic acid is taken as a measure of impurity in air. The cases occurring (of mountain fever) show the morbid agent to be at work, and it is just at this time that the stream is carrying off the autumn rains which fall upon the mountains. The intensity of the disease is directly as the dose of the poison. The cases coincide with the times of snow-melting; at Fort Bridger, for instance, May, June, and July. This post is 7,000 feet high and on the northern slope of the mountain, so that the springs are late. The thaw begins in April, and streams are turbid till July. The correspondence in time between the autumnal rain-caused rise in the streams and the increased fever in November is noted as above. The post is free from disease when there is no snow on the hills. Sporadic cases have occurred, all of which have been connected with the use of impure water. The less frequency of fever among emigrants now is probably due to quicker travelling and shorter exposure to the cause of disease. At Fort Douglas fever is rare, the water at that station being kept comparatively free from malarial contamination. Care is taken (Captain G. W. Davis reports) to avoid suspended matter in filling the reservoir. On March 26, 1877, running water gave 0.22 per million, whereas the post supply gave only 0.16.

He criticises the views of Dr. Woodward, who insists upon the enteric element in all camp fevers; and he justly says that a new name, *typho-malarial*, is no more called for than *scarlatino-malarial*, or *variolo-malarial*, where scarlatina or small-pox might occur in ague-smitten patients.

Finally, Dr. Smart proposes to classify the camp fever as follows:—

1. Malarial fever, the result of cutaneous and pulmonary absorption of malarial exhalations.
2. Aqua-malarial fever, the adynamic remittents caused by the ingestion of malarious waters.
3. Typhoid fever, originating in the specific causes of abdominal typhus, and occurring either uncomplicated or complicated in its symptoms and progress by exposure of the subject to malarious exhalations, or deterioration of his constitution by the use of malarious water.

In connexion with the above interesting observations I may recall to notice the analysis I made of the water of Rakus-Tal Lake in the Himalayas, given in last year's Report, where the ammonias were exceptionally large, 0.56 of free and 0.70 of albuminoid. This may be accounted for by the melting of the snows in the mountains, just as the greater purity of lakes in this country may arise from the fact of their chief feeders being rain and not snow, added, of course, to the fact that there are fewer districts from which winds could carry up organic matter.

Dr. Smart notes the absence of *nitrites* as a proof of the freshness of the organic matter; he says, however, nothing of *nitrates*. It would have been interesting to know if they were present as signs of older contamination. The question of nitrification\* is very important. Formerly it was looked upon as a process of oxidation, but Pasteur in 1862 suggested fermentation as a cause. Schliessing and Munz (Comptes Rendus, February 1877) made some important experiments; they took a long glass tube and filled it with sand, first heated to redness and then mixed with powdered limestone. Through this they passed a stream of liquid sewage, so that the stream took eight days to pass the length of the tube. No change took place for eight days, and then nitric acid began to make its appearance at the expense of the ammonia, which finally all disappeared. Vapour of chloroform was now added; after six days nitrification ceased; after the chloroform was removed the nitric acid did not appear again for a month.

R. Warington (Chemical News, December 14, 1877) found that carbolic acid arrested the process, and that chloroform and carbon bisulphide stopped it altogether; also that light arrested it. All this corresponds with the idea of a ferment, probably of a fungoid nature.

\* See Nineteenth Century, vol. 3, p. 560, March 1878.



*Cholera in Relation to Certain Physical Phenomena.*—T. R. LEWIS, M.D., and D. D. CUNNINGHAM, M.B., special assistants to the Sanitary Commissioner with the Government of India.

This valuable Report is an extension of the researches already made by its authors and reported in a former volume. These were made with reference to Calcutta alone, and we now have similar observations extended to other parts of the Bengal Presidency so far as data are available. A large number of important facts are given with reference to physical phenomena and their bearing on the prevalence of cholera. The authors appear inclined to reject the theories of transmission of cholera from person to person, or through the medium of drinking water, and are strongly in favour of the soil theory of its origin as enunciated by Pettenkofer. They institute a comparison between cholera and malarious disease, claiming for the former a soil origin as much as is accorded generally to the latter, and finding no greater difficulty in the one case than in the other in accounting for independent outbreaks of disease in places a thousand miles apart. They even think the case of ague more remarkable and inexplicable than cholera, seeing that if a person is smitten with ague he hardly ever gets rid of it. That the soil theory, however, should solve the problem better than the others that have been proposed has not, I think, been made out, even although we may admit the importance of the soil as one factor in the production or propagation of the disease.

5. *Equipment of the Soldier.*—The partial adoption of the "Oliver Magazine Equipment" in place of the "Valise Equipment" is a step of great importance. The new equipment differs but little from the old in principle, but the details involve various changes which seem chiefly for the better: 1. It is simpler, there is less of the complication of straps and buckles, which is certainly a drawback to the "valise;" 2. It does away with the havresack, and consequently with a cross-strap; 3. It fixes the water bottle in the waistbelt, and gets rid of the cross-strap necessary on the old plan; 4. It enables the soldier to carry a much larger quantity of ammunition, a vital question in the present day; 5. It provides a convenient second bag for his spare kit; 6. It adds a waterproof sheet, a most valuable article in campaign; 7. It is altogether easier of carriage, whilst it does not so completely cover the back and so prevent transpiration. Opinions have hitherto been in its favour on most points.

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## APPENDIX No. II.

## LIST OF OPERATIONS PERFORMED AT THE ROYAL VICTORIA HOSPITAL, NETLEY, DURING THE YEAR 1877, WITH SHORT ABSTRACTS OF THE MORE IMPORTANT CASES.

By Surgeon-Major J. H. PORTER, A.M.D., Assistant Professor of Military Surgery.

Operations.	Number of Cases.	Diseases.	Result.				Remarks.
			Successful.	Otherwise.	In Hospital.	Died.	
<i>Amputations.</i>							
Through the first phalanx of forefinger, right hand.	1	Contraction of forefinger, right hand.	1	—	—	—	
Big toe of left foot -	1	Syph. sec., disease of bone of toe.	1	—	—	—	
<i>Excisions.</i>							
Left elbow joint, by the vertical method.	1	Caries of left elbow joint.	1	—	—	—	See Case No. 1.
Right elbow joint, by the vertical method.	1	Caries of right elbow joint.	—	—	1	—	
Right wrist joint, by Mr. Listers' method.	1	Caries of right wrist joint.	—	—	1	—	See Case No. 2.
Removal of portion of lower jaw.	1	Epithelial cancer of lower jaw.	1	—	—	—	See Case No. 3.
<i>Urinary Organs.</i>							
Radical cure of stricture, Holt's.	2	Stricture of urethra -	2	—	—	—	} See remarks on stricture of urethra.
By dilatation -	24	" " -	24	—	—	—	
Internal urethrotomy -	1	" " -	1	—	—	—	
<i>Genital Organs.</i>							
Tapping and injecting with iodine.	8	Hydrocele -	8	—	—	—	
<i>Circumcision</i> -	3	Phimosis -	3	—	—	—	
<i>On the Anus.</i>							
Removal by Smith's clamp and actual cautery.	4	Hæmorrhoids -	4	—	—	—	
<i>Fistula.</i>							
Division of sphincter -	8	Fistula in ano -	8	—	—	—	
<i>Blood Vessels.</i>							
Ligature of left external iliac.	1	Aneurism of left femoral artery.	1	—	—	—	See Case No. 4.
<i>Tumours.</i>							
Removal of -	1	Tumour, left side of face.	1	—	—	—	
Aspiration of -	1	Tumour of head -	1	—	—	—	
Removal of portion of lower lip.	2	Epithelial cancer of lower lip.	—	—	2	—	See Case No. 3.
<i>Plastic Operation</i> -	1	Loss of portion of lower lip.	1	—	—	—	

Operations.	Number of Cases.	Diseases.	Result.				Remarks.
			Successful.	Otherwise.	In Hospital.	Died.	
<i>Removal of Bone.</i>							
Of nose - - -	1	Syph. sec., disease of bone of nose.	1	—	—	—	See Case No. 5.
Of palate and upper jaw -	1	Syph. sec., disease of bone palate, and upper jaw.	1	—	—	—	
Of forearm - - -	1	Compound fracture of left radius.	1	—	—	—	
<i>Skin Grafting.</i>							
On face - - -	1	Gun shot wound of face.	1	—	—	—	
On leg - - -	1	Ulcer of leg - -	1	—	—	—	
<i>Tapping.</i>							
With Coxeter's aspirator	1	Hepatic abscess -	1	—	—	—	

*Case No. 1.—Excision of Left Elbow Joint.*

A. S., 60th Rifles, aged 29 years, of eleven years' service, a strong healthy looking man with powerful muscular development, served nine years in India, where he had suffered from four attacks of rheumatism, twice from dysentery, and frequently from fever and ague. On each occasion of being attacked with rheumatism the left elbow joint was most severely implicated. Has twice suffered from primary venereal, but never from secondary symptoms of any form.

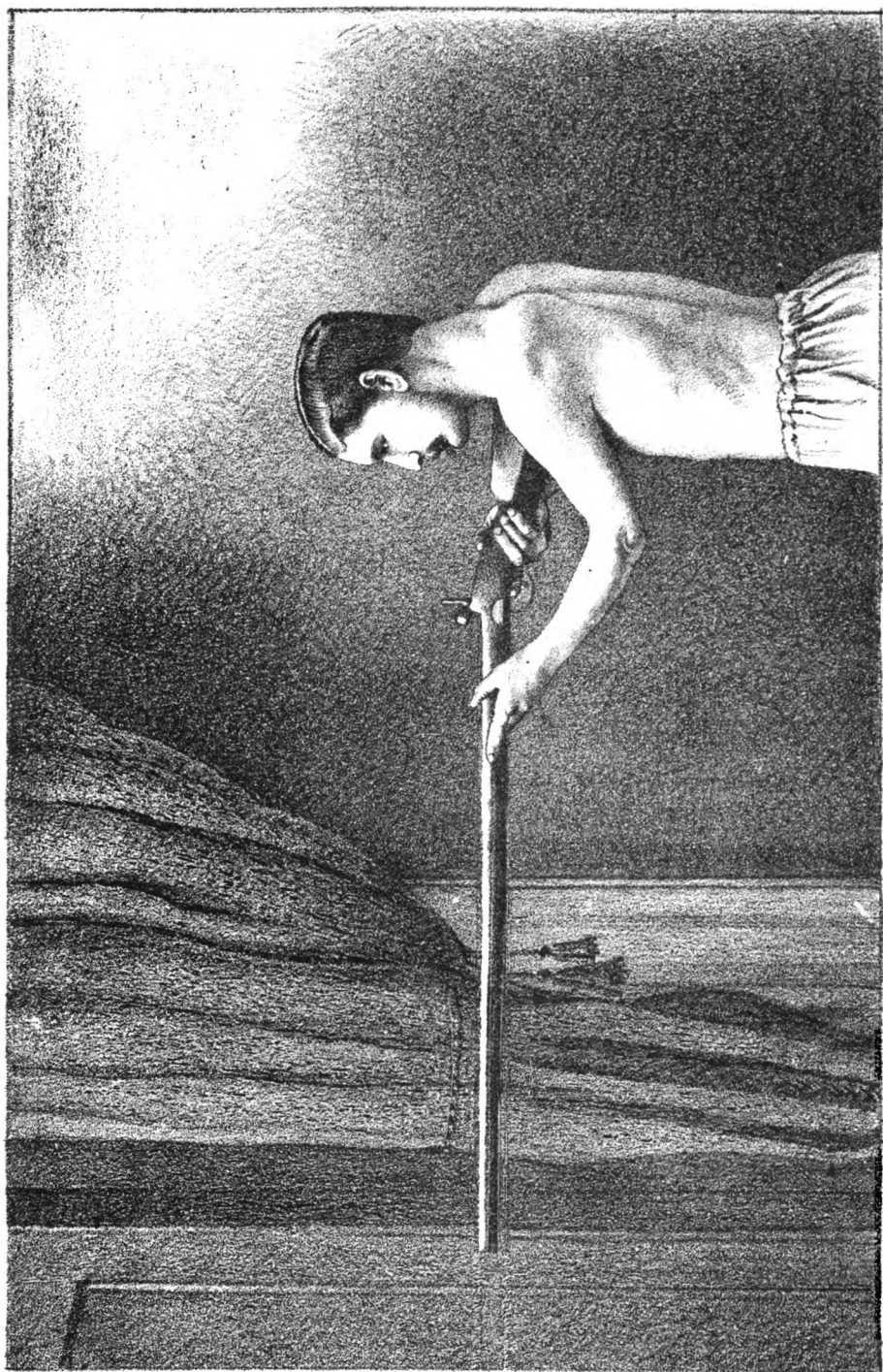
In August 1875, while stationed at Fort Attock, his left elbow became very stiff and painful, and he found after three days of suffering he was unable to flex or bend it, which necessitated his being constantly under treatment till February 1876, but without any permanent relief, notwithstanding every variety of treatment. He was invalided to England in April 1876, and arrived at Netley the following May; his condition of health was fair, the left elbow considerably swollen, stiff, and painful, and as the limb had been kept in a straight position, being that which gave him most ease, he was quite unable to flex the forearm.

There was a slight hardness in the anterior of the joint corresponding to the coronoid process of the ulna, this was the most painful part, but pain was also referred to both condyles when the limb was interfered with, counterirritants, passive motion, warm arm baths, as well as the administration of iodide of potassium and tonics having been used without any benefit, on the 19th of June 1876 he was placed under the influence of ether, and the adhesions of the joint forcibly broken down, the arm being retained at a right angle on a hinged elbow splint, on which it remained until the 31st of July, exercise of the joint being daily enforced for a few minutes.

This operation produced very little constitutional disturbance or local irritation, and he proceeded on two months' sick furlough, with injunctions to exercise the arm daily. On return from furlough there was considerable power of flexion and extension in the forearm with less pain and uneasiness in the elbow, but the limb was inclined to take a straight position (being the easiest) notwithstanding the daily use of a weight suspended over a pulley, and the application of angle splints and plaster of Paris bandages.

Being a clerk by profession he was most desirous that the forearm should be permanently flexed, if the power of doing so at will was impossible to enable him to place it on a desk so as to secure paper when writing or ruling.

All attempts having failed to permanently fix the forearm in a bent position, or to relieve the constant uneasiness in the joint, especially at night, it was decided to excise the joint; this operation I performed on the 17th April 1877, by a longitudinal incision of about eight inches in length, the bloodless method, being adopted and the patient under the influence of ether and chloroform.

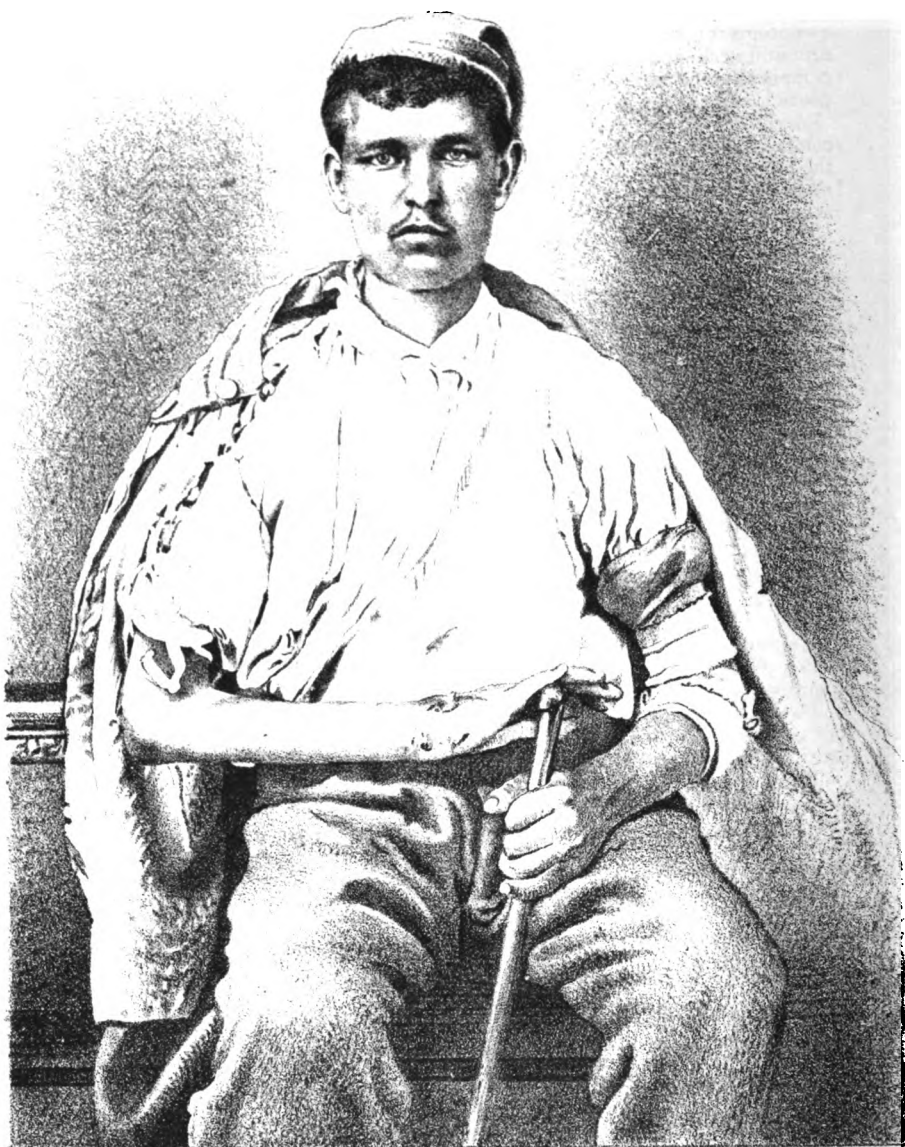


DANCEFELT 17422 BEDFORD ST COVENT GARDEN.

PRIVATE A.S. 60<sup>TH</sup> RIFLES. EXCISION OF THE LEFT ELBOW JOINT.  
CONDITION FIVE MONTHS AFTER THE OPERATION.







CONDITION OF THE RIGHT WRIST OF GUNNER J.H. PRIOR TO  
THE OPERATION OF EXCISION BY SURGEON MAJOR J.H. PORTER.

After the operation the limb was placed on a hard pillow in the straight position, and he remained very comfortable for about five hours, when hæmorrhage in the form of oozing set in, necessitating the opening up of the wound, and the free application of a solution of the perchloride of iron to control it. No vessel could be detected, the bleeding appeared as if nature was trying to relieve a gorged circulation brought about by the blood being forced back from the diseased arm by the application of the elastic bandage for the "bloodless method."

On the following day, at 10 a.m., hæmorrhage again set in requiring the re-opening of the wound and the application of perchloride of iron; this interference was followed by a copious discharge of pus, which left a healthy granulating surface, and he progressed satisfactorily till the 2nd May, when symptoms of erysipelas appeared in the wound, which extended up the arm and neck and over the left shoulder; from this unfortunate and severe complication he recovered in about sixteen days, after which his health improved, and the wound rapidly healed.

According to my invariable practice in such cases flexion of the fingers was commenced the day after the operation, and passive motion of the forearm for the purpose of securing pronation and supination on the fifth day, but it was necessary to discontinue all exercises for some time in consequence of the attack of erysipelas.

The result of the operation was satisfactory; the patient when leaving the hospital on the 9th of October, nearly six months afterwards, having full and complete power over the hand and fingers, he was able to extend the forearm, hold a rifle at "the present," as shown in illustration, touch his head with his hand and place it behind his back so as to grasp the other arm. He could secure paper on a writing desk with it for the purpose of writing or ruling, and carry a considerable weight.

The following is a description of the portions of bone removed from the elbow joint:—

The articular surfaces of the bones placed in their natural position the joint is seen surrounded with pulpy gelatinous looking tissue which invades the ligaments and fibrous capsule and the origin of the various tendons in its neighbourhood. The gelatinous looking tissue is also found in the interior of the joint, in situations where the bones have not been ankylosed and affecting the surface of the cartilage, which appears to be degenerating into that form of tissue. The structure of this pulpy tissue is made up principally of fat corpuscles and fatty molecules which have insinuated themselves in every direction and separated the white fibrous tissue, which appears as a fine stroma or network enclosing and holding fatty globules and molecules.

Pus cells are also observed in the interior of the joint, but not in any great quantity.

The articular surfaces are in many places much eroded and quite denuded of cartilage, especially that of the internal condyle, and trochlear surfaces on their posterior aspects.

There is on the articular surface of the lower part outer condyle a considerable growth of new bone, which is received into a thin bony concave projection, which arises from the ulna at the outer side of the sigmoid cavity in front, and forming the segment of a circle becomes continuous with the coronoid process. These two surfaces were ankylosed, but not quite firmly.

There is no cartilage in the joint lined with smooth synovia, but on the contrary it is found on the sigmoid cavity of the ulna, and on the head of the radius in a diseased condition, rough, and raised in places into soft pulpy masses with considerable thickening in other situations.

#### *Case No. 2.—Excision of the Right Wrist Joint for Caries.*

The subject of this operation was a young soldier, J. H., of the 12th Brigade Royal Artillery, who though having no hereditary history of scrofula presented in himself all the characteristic features of such a diathesis.

While stationed at Malta, October 1876, two superficial swellings appeared on the left arm, one above the elbow and the other below it. These swellings having been incised resulted in troublesome indolent ulcers which burrowed



extensively up and down the arm, and did not heal for many months after he had returned to England in 1877.

Shortly after the appearance of these ulcers he experienced dull aching pains in the right wrist, attributable to, he considered, an injury received in moving a gun shears which was accompanied by a small red tense swelling on its outer and back aspect; his appetite now failed him, he lost flesh, and felt generally unwell, other swellings soon appeared in the neighbourhood of the wrist, first to the inside and then in front, all were incised and kept open by pieces of lint or setons.

His health having seriously declined he was invalided home, and arrived at Netley on the 27th May 1877, his general condition having somewhat improved during the voyage. His state was then as follows:—A large ulcer on the left arm above the elbow connected with a sinus, at least 6 inches in length, running up the arm; a second ulcer of a triangular shape below the insertion of the triceps. The right wrist much swollen, fingers extended, and with the exception of forefinger and thumb, little or no power of flexion or extension, the tendons being apparently matted together and adherent to their sheaths; wrist joint fixed, and no power of either pronation or supination. Several openings of sinuses exist, one over and in connexion with the fifth metacarpal bone, another on the opposite side of the hand, three in front of the wrist, situated in a row and inclining obliquely forwards from ulnar to radial side of the hand in connexion with bone; these openings discharge freely. The radial artery very much enlarged in its entire course, and especially where it turns round to the back of the wrist.

Measures were at once adopted, both local and constitutional, to try and improve his health, the sinuses in the left arm were laid open from end to end and the wound dressed from the bottom with lint saturated with the salicylic acid and borax lotion.

The wrist was treated with rest and the warm arm bath twice a day, which gave great relief.

His health soon improved, the wound on the left arm healed, and by the end of October, 1877, his condition was such that excision of the wrist was considered advisable as holding out the best prospect of giving him an useful limb.

On the 30th October excision of the right wrist was performed by Professor Listers' method, the patient being under the influence of ether, and the limb rendered bloodless by Esmarch's elastic bandage. There was considerable difficulty experienced in removing the carpal bones, which were found extensively diseased and disposed to break down under the slightest force or pressure.

The radial artery being very large it required care to avoid in making the radial incision, and to keep it out of the way, and protect when dissecting out the trapezium. The pisiform being extensively diseased and enlarged it was entirely removed. The elastic band having been taken off the wound rapidly filled with blood, which was checked by securing one small vessel and washing it out with a solution of chloride of zinc and glycerine, 30 grains to the ounce, and free exposure to the air.

About two hours after the operation hemorrhage appeared in the form of oozing to such an extent as to necessitate placing the patient under the influence of ether, opening of the wound, applying pressure and a solution of perchloride of iron to the points from which the blood oozed. After this he progressed satisfactorily until the morning of the 2nd of November, when there was slight oozing, but not sufficient to require any disturbance of the wound; however, towards midnight it increased to such an extent that it was found necessary to open up the wound and apply the perchloride of iron, this with direct pressure and ice bags checked it and it did not recur. The patient from thenceforward progressed most favourably, a copious discharge from the wound ensued, which was absorbed and deodorised by pads of sawdust derived from red pine placed by the side of the splint.

Movement of the fingers was commenced the day after the operation, and every day subsequently passive movements enforced. On the 11th of November he was able to sit up in bed, and on the 13th he sat up at the fire.

By degrees the splint was cut away at the hand so as to leave the fingers free, and at the elbow to allow free motion of the forearm.



**GUNNER J. HALES. DRAWING REPRESENTS CONDITION OF THE  
WRIST A LITTLE OVER FOUR MONTHS AFTER DATE OF EXCISION.**





Royal Victoria Hospital  
Netley Dec. 19<sup>th</sup> 77.

Sir.

It is now seven  
weeks since my wrist  
was operated on, the  
wounds are almost healed  
and it feels nice and strong.

I am Sir

Your Most O<sup>b</sup>d<sup>t</sup> Serv

J H  
R. A

A sore having formed over the internal condyle a hole was cut in the splint opposite to it, which removed all pressure, and it soon healed.

By the end of November the patient had so far recovered that he was enabled to carry his arm in any position, he could extend the hand without support for a few minutes, the wound having completely filled in, he could very slightly pronate and supinate the forearm and flex and extend the fingers.

On the 5th December Listers' splint was removed and replaced by a light gutta-percha splint under the wrist and palm of the hand, which gave him more freedom of action for the fingers. He commenced to use the weight and pulley on the 11th December, which exercise greatly improved the condition of the muscles of the forearm and the powers of flexion and extension of the fingers and wrist. On that date he was able to raise his hair brush from the table and brush his hair, but, of course, in a very quivering and shaky manner.

A large pen handle with a pen fixed in it was placed in his hand on the 13th of December, when he commenced exercises in writing; the accompanying is a specimen of his writing seven weeks after the operation, December 31st. The patient is still under treatment, the wounds are almost healed, his hand and fingers have become strong and flexible, and he is able to brush his hair with ease, sweep the floor, and pick up a pin with his forefinger and thumb.

*Case No. 3.—Epithelial Cancer of the Lower Lip, Removal by Operation, Recurrence of the Disease in the Gums and Alveolar processes. Partial Excision of Lower Jaw.*

Private T. C., of the 89th Regiment, an Irishman of 20 years' service, aged 38. Has suffered twice from primary syphilis, was in the habit of smoking clay pipes; no hereditary history of cancer.

In April 1874 he noticed a small pimple at the edge of the lower lip, which increased in size and hardness, but did not inconvenience him till the following September, when he was admitted into hospital at Bangalore, a small ulcer having formed in the middle of the lip on its outer edge.

The surface of this ulcer was destroyed with chloride of zinc, and he was discharged from hospital on the 2nd February 1875. The sore was then healed, but a little induration remained.

The disease appears to have remained stationary until January 1876, when he went to Burmah, where the ulcer again broke out and the lip became very painful.

The progress of the disease from thenceforth appears to have been very slow, and on his arrival at Netley in May, 1877, it had not, according to his own account, increased for some time.

Not having derived any benefit from treatment it was considered advisable to remove the disease by operative measures, and on the 25th July the mass was excised by a V shaped incision through the healthy part of the lip at either side of the disease and extending from the margin of the lip to the chin. A large gap was the result of this operation which it was necessary to fill up at a subsequent plastic operation by a piece of skin taken from the left of the chin which healed quickly, the result being so far satisfactory.

About the beginning of September the disease again made its appearance, apparently springing from the gums and alveolar processes, it quickly spread along the gums and implicated a small portion of the newly formed lip, giving rise to great pain and inconvenience, also a constant flow of saliva from the mouth over the chin, especially at night.

There being fortunately no enlargement of the glands, and the man being most anxious that another attempt should be made for the extirpation of the disease, it was decided to operate with a view to the removal of a portion of the alveoli or of the lower jaw, if, on exposing the parts, such was found necessary.

Accordingly, on the 8th of October, the patient being placed in the recumbent position, his shoulders rather raised so as to prevent the blood flowing down his throat, and under the influence of chloroform an incision was made through the centre of the lip down to the point of the chin, and from where this ended a lateral incision on either side along the base of jaw to where the facial artery turns over it. The soft parts having been well retracted

and gums carefully examined, it was found that the disease extended on either side as far as the second bicuspid tooth on the left side and the first on the right side, but not entering into the base of the bone; these teeth having been withdrawn a notch was made with a small saw in front of the remaining teeth down towards the base of the jaw on each side, the instrument was then applied in a horizontal direction, a little above the base of the jaw, and the bone cut till the teeth of the saw could be felt with the fingers in the inside of the mouth. A strong bone forceps was then applied, and the diseased mass lifted out of its position.

Two small vessels were secured, the parts washed with a strong solution of chloride of zinc, 30 grains to the ounce of glycerine, and the actual cautery applied to the soft structures at the base of the tongue from whence there was some oozing.

The external wounds were then brought together by twisted and interrupted sutures and the whole dressed with carbolised lint.

The patient was fed for several days by means of a tube attached to an ordinary feeding cup. The parts rapidly united and he progressed satisfactorily until the end of November, when a fungoid looking growth was observed springing from the left side of the lip inside the mouth, this he requested to have removed, which was accordingly done on the 3rd December 1877, the patient being under the influence of chloroform. The surface of the wound was freely cauterised with the actual cautery, and the parts, when the slough came away, were to all appearance healthy, but at the end of December, when this report was completed, there were evidences of a recurrence of the growth and induration of the lip.

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*Case No. 4.—Femoral Aneurism, Left side; Failure of Treatment by Compression and Application of Esmarch's Bandage. Ligature of Left External Iliac Artery, and Recovery.\**

The subject of this case was J. McQ., 1st battalion 25th Regiment, a recruit of nearly six months service, aged 28, he was transferred from Shorncliffe to Netley Hospital on May 26th for a large femoral aneurism, left side, immediately below Ponpart's ligament.

On admission he appeared very anxious and irritable, as he was suffering great pain. Previous to his enlistment (December 1876), he was a sailor, he had contracted primary syphilis in January 1865, which was followed by a suppurating bubo in the right groin. He, however, is a healthy looking man, is married, and has had seven healthy children.

It appears that about the end of February 1877, whilst "doubling" in the barrack-square at Shorncliffe, he felt a prick like that from a pin in the upper part of the left thigh; this gave him no inconvenience until the end of March, when in the gymnasium, vaulting the "horse," he suddenly felt a pain in the left groin, and on applying his hand, detected a pulsating tumour about the size of a walnut. He was treated at hospital for some time, but the tumour increased in size, and he was attacked with pain in the knee and thigh. On the 15th of April pressure was applied above the tumour, and continued interruptedly for many weeks, but without any benefit. On arrival at Netley the tumour extended downwards from Poupart's ligament for about three inches and a quarter, and transversely for three inches and three quarters, the outer margin being in a line with the anterior superior iliac spine. There was strong pulsation in the tumour, the skin covering it was smooth, and at the most prominent part a circular pink spot about the size of a threepenny piece was observed, while the lymphatics in the vicinity of the aneurism were enlarged and tender.

On manipulating the tumour, it conveyed the sensation as if some coagulation had taken place; and it was therefore considered advisable to again try the effects of pressure above the tumour on the external iliac, pressure below being impracticable.

The necessary precautions having been observed, Read's compressor (3rd series) was applied over the external iliac on the 3rd of June and continued interruptedly until the 22nd, when the skin over the course of the artery

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\* The operation was performed by Surgeon-Major J. Fleming.

became so tender that pressure had to be discontinued, while the pain from the aneurism necessitated the administration of opium and hypodermic injections to procure sleep. It was then decided to give Esmarch's elastic bandage a trial, some successful cases having been recorded in the medical journals about this time; it was accordingly applied on the 21st and 22nd of June for one hour and fifty minutes respectively, the patient being for the time under the influence of chloroform. At the end of this time, though the tumour felt harder and the pulsation less, there was no permanent good result, rather the contrary, as the patient complained of increased pain along the course of the femoral artery as well as in the knee and ankle.

As the means adopted for inducing coagulation in the sac were unsuccessful, and as the condition of the patient was rather critical, it was decided, to apply a ligature on the external iliac.

The patient having been prepared, the bowels freely opened, the operation was performed on July the 9th under the influence of ether, administered with Ormsby's inhaler and in the usual manner, by a curved incision above Poupart's ligament. There was some difficulty in reaching the vessel, and avoiding injury to the peritoneum, as it was found to be closely adherent to the transversalis fascia which was ecchymosed in places, the result, no doubt, of long continued pressure from the artery compressor in that situation.

The artery having been found healthy, and pressure on it entirely controlling the flow of blood in the sac, a silken ligature was applied at the middle part of its course.

The upper part of the wound was brought together by a silver suture, the lower left open with the two ends of the ligature protruding, and a pad of antiseptic gauze placed over it to absorb the discharges. The limb was then wrapped in cotton wool, elevated a little, slightly flexed and everted, thus placing it in an easy position supported by pillows, and thirty minims of Battley's solution of opium were given.

The case progressed favourably without a bad symptom, and without a rise in temperature beyond normal, except on one occasion when it rose about 1.5 deg., but which soon regained its normal condition on the bowels being fully evacuated. At that time some deep seated pain was complained of in the groin, but that disappeared very soon, and was, no doubt, owing to the same cause.

The ligature came away on September the 6th, 58 days after the operation, and the length of time it took in doing so was probably owing to the wound uniting deeply between the loop of the ligature in front of the vessel, which may have enclosed some of the tissues.

The wound healed perfectly, leaving a thin line of cicatricial tissue in the skin; no pulsation returned in the sac, which almost disappeared. The patient could walk without any degree of discomfort, and was discharged from hospital (invalided) on the 5th November 1877.

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*Compound Fracture of the Left Radius with Dislocation of the Ulna. Removal of half an inch of the Radius by the Antiseptic Method. Perfect Recovery, without Suppuration, in Two Months.*

J. W., aged six and a half years, a strong, healthy, intelligent little fellow, was admitted into the surgical division, Netley Hospital, on the morning of the 15th September 1877; he was then in a state bordering on collapse, having fallen from a verandah 12 feet from the ground. I saw him about five minutes after the accident, when he was suffering from a contusion on the head and a compound fracture of the left radius about an inch and a half from the wrist joint. The bone protruded for about half an inch on the anterior of the forearm and towards the ulna. The ulna was dislocated forwards and inwards on the side of the carpus, and the hand itself bent back on the forearm by the force of the extensors.

The wound had been dressed with carbolic oil and lint almost immediately he was raised from the ground, and had not been in any way soiled.

As soon as the boy had recovered from the shock he was placed under the influence of chloroform, and the wound being brought under carbolic spray, reduction of the fracture and dislocation was attempted, but this was found impossible, as the fracture was in an oblique direction and very irregular.



The wound was then enlarged for about half an inch above and below, and a further attempt made at reduction, which being unsuccessful, I removed with a straight bone-cutting forceps the protruded portion of the bone, amounting to half an inch.

The ulna was then placed in its normal position, and, there being no hæmorrhage, the wound was at once dressed with the usual carbolised dressing, consisting of oiled silk and numerous folds of gauze. A splint was placed along the back of the hand and forearm, and secured with a light plaster of Paris bandage, the thumb and fingers being left free. The bandage was so arranged that when dry a window was formed in it for observing the condition of wound and applying dressings.

On the following day the bandage in the immediate neighbourhood of the wound was slightly stained from oozing of blood, but was perfectly dry, and there was no pain or the slightest constitutional disturbance.

On the 24th September, or ninth day after the accident, the dressings were removed under the carbolised spray. The oiled silk was found damp from a slight serous-looking discharge, but there was no pus or unpleasant smell, and the wound had almost healed. The wrist was, however, considerably swollen and painful, the hand and finger being very stiff. On the 28th the swelling of the wrist had subsided, which caused the bandage to become loose; it was, therefore removed with the usual antiseptic precautions, and another applied, but the boy was allowed full use of his fingers, over which he had slight power, and which I forcibly flexed and extended.

October 9th.—The dressings were again removed, but the wound was perfectly dry and healed. A short splint was now secured by an ordinary bandage to the inside of the arm so as to merely support the wrist and seat of fracture, and allow free motion of the hand and fingers.

October 15th, or one month from date of accident, the wrist and seat of fracture still considerably swollen, and power of pronation and supination impaired; commenced exercises to secure these motions.

November 5th.—The boy is now able to dispense with the splint, and can lift a considerable weight without inconvenience. The power of flexion and extension of the hand and fingers and pronation and supination of the forearm are unimpaired.

On the 15th November he was discharged from hospital, being able to do as much with the injured arm as with the sound one. There was some thickening about the seat of injury which rendered the lower third of the forearm not quite so symmetrical as the other.

#### REMARKS ON CASES OF STRICTURE OF THE URETHRA.

The numerical return shows 27 cases of stricture of the urethra. Of these the following facts have been observed as regards causes, complications, number in each urethra, situation, and treatment, &c.

*As to the Causes.*—Eighteen were stated to be due to gonorrhœa alone, two to gonorrhœa and injury, one to gonorrhœa and exposure to cold, one to exposure alone, two to syphilitic ulcer, and in three the patients were unable to account for their origin. Injections had been used for the treatment of gonorrhœa in five cases.

*Complications.*—In two cases there were perineal fistula, in one scrotal fistula, and six were accompanied with urethral fever on passing instruments.

*Number of Strictures in each Case.*—Of the 27 cases no less than 11 had two strictures each, making a total of 38 strictures.

*Situation of the Strictures.*—In four cases the stricture was at the external meatus, in one case it was within 1 inch of the meatus, in two between 1 and 2 inches, in seven between 2 and 3 inches, in two between 3 and 4 inches, in five between 4 and 5 inches, in nine between 5 and 6 inches, in six between 6 and 7 inches, in one between 7 and 8 inches, and in one at the neck of the bladder.

The treatment pursued in 24 cases was gradual dilatation. Holt's forcible dilator was used in two cases, followed by the use of metal sounds or elastic bougies, and in one, which had its origin in a syphilitic ulcer, internal urethrotomy was successively adopted.

## APPENDIX No. III.

REPORT ON THE ADMINISTRATION OF CHLOROFORM AND  
ETHER AS ANÆSTHETICS.

By Surgeon-Major J. H. PORTER, Assistant Professor of Military Surgery.

During the year 1877 chloroform and ether were administered at Netley Hospital in 7 and 29 cases respectively.

The following is an analysis of the time taken to place the patient under its influence, the quantity used, and their general effects as taken from a register kept for that purpose:—

*Chloroform.*

	Minutes.	Seconds.
Shortest time taken to place under influence	- 5	0
Longest " " "	- 15	0
Average " " "	- 12	0
Average time under influence - -	- 25	30
Smallest quantity used in any one case -	- 2	drachms.
Largest " " "	- 8	"
Average quantity used " - -	- 4	drachms 10 min.

No vomiting occurred.

Slight excitement occurred in two cases during or after administration of the drug.

Spasms occurred in three cases.

*Ether.*

	Minutes.	Seconds.
Shortest time taken to place under influence	- 1	0
Longest " " "	- 12	30
Average " " "	- 4	10
Average time under influence - -	- 10	46
Smallest quantity used in any one case -	- 1	ounce.
Largest " " "	- 3	oz. 4 drachms.
Average quantity used " - -	- 1	" 6 "

Vomiting occurred in eight cases during or after administration of the drug.

Excitement occurred slightly in 21 cases during or after administration of the drug.

Mr. Lambert Ormsby's inhaler by Coxeter and Son was the instrument used in the 29 cases.

The average quantity of ether administered was 1 ounce and 6 drachms, which included that expended during operative measures; one operation being that of ligature of the external iliac artery, which took 19 minutes; another, excision of the elbow joint, 25 minutes; and a third, excision of the wrist, 43 minutes.

With reference to 12 minutes 30 seconds being the longest time taken to place the patient under the influence of ether, the delay was due to want of attention to some details in using the inhaler, and there is little doubt that with due care and attention to instructions patients may be placed under the

influence of ether with Mr. Ormsby's inhaler in from one to three minutes, a decided advantage for the patient and operator.

It was observed that when the patients were quickly brought under the influence of ether they sooner recovered from its effects than by the slow process or that of intoxication, nor did its disagreeable taste remain with the patients, which has on several occasions been a cause of complaint, so much so that patients have stated they would prefer bearing an operation without an anæsthetic than endure the taste of ether, which has lasted for several days.

Whenever practicable the patient had no food for at least four hours before the administration of ether, and in such cases where this rule could not be attended to, there was invariably vomiting either during the operation or after it.

Stimulants were strictly prohibited for some time before and after the administration of the drug.

In comparing the average quantity of ether used in this report with the reports for the years 1875 and 1876, when Doctors Morgan and Skinner's inhalers were used, a considerably less expenditure is apparent; that of 1875 being 5 oz. 1 drachm; 1876, 6 oz. 3 drachms; and 1877, 1 oz. 6 drachms.

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## APPENDIX No. IV.

## REPORT ON THE JOWAKI EXPEDITION.

By Surgeon-Major F. W. MOORE, Senior Medical Officer, Field Force, Jowaki Expedition.

December 1877. January 1878. February 1878.

Entering now on the third month of the expedition, the Jowakis are at last coming to terms, and the troops are returning homewards to Peshawar.

As senior medical officer of the British Force it is incumbent on me to narrate, as regards our side of the question in a professional point of view, those circumstances which were deemed worthy of observation during the progress of operations. The tribe we warred against is an independent one, being a section of the Adam Kheyl Afreedis; they inhabit a narrow belt of mountainous country to the south and west of the Peshawar Valley on the extreme border of the north-west frontier of India. This belt branches off from the Soopheid Koh mountains, and runs in a south-easterly direction towards the Indus.

The Jowakis are bounded on the north by the Mohmunds, and on the east by the Khuttaks, on the west by the Shinwarris, and on the south by the Oraksas.

As a barbarian race producing no literature, no authentic records exist to prove their origin, but it is supposed they are direct descendants from Afrid, who migrated from Ghor in the tenth century.

Their country, stretching 15 miles in length and 13 in breadth, is a succession of mountainous ranges running parallel to one another, and rising from 2,000 to over 4,000 feet in height, and intersected by beautiful fertile valleys. Seams of connecting spurs from the lower ridges traverse the valleys, and render the country so rugged that it appears almost inaccessible to any but this lithe and hardy race. The Jowaki Afreedi is a tall broad-shouldered muscular man, with a light complexion and handsome features. His mode of living makes him inured to desperate hardships, he tills but little soil, and his arid mountains afford no food; his existence on the whole is very hazardous, as almost from the cradle to the grave there is no crime that he is not addicted to. He is an unrivalled hill-robber, and his blood feuds amongst the Afreedi clans, and his plunderous raids amongst the Lowlanders, have made him an object of terror along our north-western frontier.

At the birth of a Jowaki solemn prayers for days are uttered to Mecca by his wicked parents, imploring that their son may turn out the ablest robber of his clan, and in due time comes the fulfilment of the prayers, for the youth's highest ambition, incited by such advice, takes the line of excelling in the foulest and blackest of crimes.

He is of the Mahomedan religion of the Sunnite order, and speaks the usual Afghan language Pushtoo, an off-shoot of the Persian tongue. In ordinary times of peace he is little known to the European, as he carries on only a small trade in firewood, charcoal, and matting, and to an ordinary Hindoostanee speaker he is unintelligible. The dress of the tribe is very simple, and like that of all mountaineers, very dirty. It consists of a coarse cotton shirt with a band round the waist, a pair of loose trousers of the same material which reach a little below the knee, and a tight-fitting skull cap placed over the close shaven head, with a winding cotton cloth round the chest and shoulders. In winter he adds a sheepskin coat called a Postheen, wearing the woolly side in for warmth, and vice versa when the rain comes on. This overcoat is a very substantial article, and was purchased in thousands for our camp followers, as it is impervious to wet; it has one great objection, it harbours parasites. The dress of the Jowaki women seemed to our notions a very sensible one,—a dark blue cotton gown short as a school girl's, her trousers consist of coils of dark blue cotton cloth rolled round her legs, and a blue cotton shawl seamed with a red stripe slopes gracefully over her head and shoulders. They usually walk barefooted, and from severe toil become prematurely old. The young girls we did not see; they were carefully hidden from our view, perhaps the legend of the brutal and licentious soldiery had reached their guardian's ears.

From boyhood the Afreedi is practised to the use of arms, and the matchlock slung on his shoulders is as much a part of his dress as the matted sandals he wears on his feet; this weapon is only unslung when he enters to trade in a large city like Peshawar, as the law forbids his wearing it there. On the war-path as we saw the Jowaki Afreedi, he was armed to the teeth, he had the Brunswick rifle, the old Queen's, the sporting rifle, the Snider, and his own primitive flint-lock rifle and blunderbuss. In his belt was a flint-lock pistol, and a brace of daggers. By his side hung a tulwar, a sword somewhat resembling a Turkish scimitar, with a heavy trench and blade so sharp that it will split a hair. I have seen in this campaign wounds from the tulwar of these Jowakis where the blade was merely drawn across the limb with barely any pressure, and all the arteries and tendons were severed and the periosteum of the bone irretrievably damaged. The wound that caused the death of the gallant Captain Swiney, of the 17th Bengal Lancers, was simply the draw of the Afreedi's tulwar across his arm, which divided the brachial artery, and he bled to death.

With these weapons and a sheepskin full of flour this sturdy savage goes to battle, and he is no mean foe in his rocky mountains.

The Mahomedans have the character of being the most warlike race in India, and ever since the British Government increased its territory beyond the Indus the Afreedi tribe has given trouble, hating, as all Mahomedans do, the advent of British rule, and the further north we proceed the more is law and discipline despised by these wild tribes. The endeavours of Government to further civilization amongst them is the chief cause of these frontier wars, as it cuts at the root of their cherished freebooting lawless existence.

Having so far spoken about this tribe and their country, I will now narrate the circumstances that brought about this small war, and the march of our troops from end to end through their territory. Their plunderous raids in the plains for several years past gave much concern to the Government, and every endeavour short of arms was used to pacify them, until at last their daring murders culminated in the cold-blooded massacre of nearly the whole of a Sepoy guard of 18 men at a village called Shakkote, on the high road to our Sanitarium at Cherat; this exasperated the authorities, and the Viceroy or India issued a war proclamation against them, stating that a British Force would advance into their territory unless they gave up the Shakkote murderers, also the British rifles they took, and as a guarantee of their future good behaviour they must pay an indemnity of 30,000 rupees.

Their reply was brief, they would not agree to any terms, they were ready to fight. In due time our force was collected, one division from the Peshawar garrison under General C. C. G. Ross, C.B., the other division, the frontier force, under General Keyes, C.B., mustering in all close to 10,000 men. This force at first sight would seem large to punish a small tribe, but considering the almost inaccessible state of the enemy's country, and vast complications that might ensue from the likelihood of the Jowakis being assisted by the neighbouring tribes of Afreedis, who are all warlike men, it is only in keeping with the sound military practice of the hour to outnumber the foe.

Of late years in all expeditions against barbarians the English have employed a force of about the same numerical strength, generally 10,000 men.

In the Lorcha Arrow business, when Lord Palmerston declared war against the Chinese, this amount of force was successful against the enemy, Sir Hope Grant being the general of the British Force. The same may be said of the successful Abyssinian War under Lord Napier of Magdala against King Theodore. Again, in the Umbeyla Expedition against the Sitanas, this number of troops under Sir Neville Chamberlain and Sir John Garcock were successful. Later still the British Force under Sir Garnet Wolseley including his mass of local levies comprised a fighting total of nearly 10,000 men when he took the field against the Ashantees and conquered them. In the present expedition against the Jowakis, the part of the force with which we are chiefly concerned, the Peshawar division under General Ross, comprising 1,500 Europeans and 3,000 Native troops, marched from Peshawar to Fort Mackeson on the third of December, a distance of 19 miles, and encamped for the night. At dawn next day, on the fourth, the troops marched six miles, and dividing into two columns, the right going up by Khundawa and the left by the Shergosha Pass, attacked the Jowakis on their first ridge of hills, the elephant battery firing

shells into them, and the infantry steadily skirmishing foot by foot up the heights till they reached the summit of the Shergosha ridge, by mid-day driving the enemy in confusion down the slopes to their towers of defence in the Bori Valley.

There were very few casualties on our side, the troops bivouacked on the heights for the night, but, unfortunately, after their very severe day's work they were left without food, as they advanced further from the base of operations than was at first planned, as it was thought from the large number of the enemy and the bold front they presented, there would have been a longer and a stouter resistance.

Next day there was continuous firing on both sides. Four Horse Artillery guns, 9 pounders, were carried up to the top of the ridge on elephants and placed into position; the very accurate firing of these guns, together with the excellent firing of our marksmen of the infantry, cleared a small ridge in front of the Shergosha ridge, and it became occupied before night-fall by our men. A few casualties were sustained. Two splendid sepoy's pikels of the 20th N. I. were literally blown to pieces by a shell from one of our guns that fell in the wrong place. At night there were several smart attacks made on the troops, these night attacks, or (chipows) as they call them, are the favourite means of warfare of the Afreedis; they usually single out pickets for attack.

On the 6th heavy firing on both sides, the shrapnells from the 9-pounders destroyed many of the native sungas (small stone walls), and several of the towers of Bori were injured by shell, and seven were blown up.

One of the villages of Bori, named Toto-Kheyl, was taken. Bivouacking was continued on the ridge, and only one small tent was erected on the side of the hill for the wounded.

On the 7th severe firing on both sides, the Spitung village was taken and 12 towers were blown up, many of our native soldiers were severely wounded; a young English soldier of the 9th was badly hit, a large bullet passed through his neck, the entrance of the wound was at the left side of the neck and the exit at the right side. Surgeon Turner, of the 51st Regiment, became very ill from exposure and had to be taken in for treatment at the General Field Hospital at Mackeson.

On the 8th the force took Nokal-Kheyl and Utan-Kheyl, and finally Bori, blowing up 27 of its towers. The guns by this time had fired over 500 rounds, and the amount of ammunition expended by the infantry must have been very large, as they were firing with very little interruption for four days, and were at work also at night defending themselves from attacks. Another soldier of the 9th received a severe lacerated wound of the lower third of the left leg from a fragment of one of the blown up towers or a récochet shot.

9th. It has been raining in torrents ever since yesterday, and the roads for transport are flooded; the men have only got their blankets, no tents, as they would be a mark for the enemy. All operations ceased. The exposure of the men night and day on those bleak heights to incessant rain and piercing cold brought on many cases of ague. The General issued an order for the force to move to the camp below, with the exception of the men who guarded the guns in position on the heights frowning on Bori. The 9th Regiment had to go to a fort six miles off to dry their clothes, as from their long continued wetting they were getting cramped and benumbed; they had a desperate march, and as they got belated they had almost to swim through some swollen torrents, and were it not for the help of some of the commissariat elephants some of the men must have perished. On this bad night many of the native followers of the camp were lost, some drowned, some died of starvation, and some died from the intense cold.

10th.—Rain ceased at 9 o'clock in the morning after a continuous down-pour of 46 hours, the thermometer being below freezing point. At early dawn a report reached me that several camp followers were lying dead in the nullahs and on the road traversed by the force going to the front between Mackeson and Shergosha. I rode out and took some Doolies with me, and after much searching discovered six bodies of dead natives, two were found drowned in the bend of a near river, two more were found embedded in a flooded swamp, these, no doubt, perished in endeavouring to extricate themselves during the darkness of the night while it was raining in torrents and bitterly cold, another body was found on a bank crushed in the mud as if an elephant

getting out of the river had fallen on him, the sixth was a wretchedly thin man lying with his face upwards apparently dead from cold and starvation. These bodies were all taken to Fort Mackeson, and the commandant gave orders to the Tesildar of the district (as no one claimed them) to have them buried or burnt according to their native customs.

There was some correspondence with the commissariat about this mortality, and the matter created much sensation at the time, as these poor natives were supposed to be employ  es of that corps.

On the 11th the troops commenced making roads in the enemy's country and found great difficulty in making them passable for the transport animals, as the mountain was composed of successions of boulders of limestone rock from base to apex. By dint of hard work by the 25th of the month a fair road over six miles in length was made, reaching over the summit of the Shergosha ridge and down the slope on the other side towards Bori.

The enemy continued making their night attacks, but succeeded in wounding only a few of our native soldiers and native servants. On the 23rd of the month the Jowakis cut down and stole 500 yards of the field telegraph copper wire, necessitating the laying down a ground wire which had to be taken up by the sappers every evening.

At dawn on Christmas Day a reconnaissance went out in force to Dansir Hill (the hill of the tank), as there is a tank on this height for preserving water for cattle during the hot weather. General Ross and some of his staff went along the Bori Pass with the 27th Native Infantry, they were fired upon and some Jowakis were shot and captured. On this march there was stiff climbing, but it was well rewarded by getting a good view of the stronghold of Pusthowni with its rich valley on a plateau 2,000 feet high, also a good view of the back of Bori. The Jowakis here were taken by surprise, for they were seen clambering up the heights with their goods and chattels, and they were driving their cattle across the valley, having left a quantity of burning fodder behind them.

At 11 o'clock on this Christmas night a large body of Jowakis made an attack on Fort Mackeson, firing first at the sentries on the outer horn work, then at the fort itself; they were, however, soon repulsed by several sharp volleys from the troops and by the sound of the cavalry advancing. The reconnaissance force and the General returned that evening to head-quarter camp, Shergosha. The next day a Seikh of the 14th Regiment died from a bullet wound received in the face at the attack on Bori, he was a very fine old soldier and had a strange history, he fought against the English at Chillian-wallah when our troops were led by Lord Gough.

A bad case was sent into Peshawar this day, a gunner whom the Jowakis had severely wounded with tulwar cuts at Bori and had to be carried into Fort Mackeson for treatment. The cold about this time was intense, it froze all night and there was ice on the pools next morning. A most miserable state of things went on till Saturday morning the 29th, for it rained incessantly for 60 hours; all operations ceased. The Jowakis themselves were so cowed by the desperate state of the weather that they fired very little even at night. Beasts of burthen were dying along the roads, for they could scarcely move on them they were in such a shocking state, the difficulties of the commissariat were great.

On the 1st of January was the first advance on Pusthowni, the troops crowned each side of the Bori Pass, which is extremely narrow, merely a mountain torrent's bed nearly two miles in length, with, at this season, only a little water flowing in the middle, a difficult pass for animals to travel, as it is covered with big boulders.

The baggage of the 9th got jammed here, and opposition to the advance was shown by bands of Jowakis firing down from distant heights. Pusthowni was soon taken, only slight opposition from the stronghold itself, though there was a good deal of firing from a hill in front. Generals Ross and Keyes now met and the force bivouacked at Pusthowni; it was bitterly cold, the thermometer continuing below freezing point during the night and morning, there was an inch thick of ice on the ponds, and the soldiers had only that dust coloured Khakee dress covering their serge tunics.

The night work before the enemy on these heights was a severe trial of endurance.

Pusthowni is a smaller settlement than Bori;<sup>1</sup> it is situated at the head of the Mussadura valley, the mouth of this valley lying opposite Cherat. On the 2nd there was a failure of signalling between the forces; though Jummo was quite close, there was much firing on this day. On the 3rd the force returned to the head-quarter camp, Shergosha; there was snow on the ground in sheltered places, and icicles were hanging from the crevices in the rocks.

Nothing of any consequence took place till the 15th, the camp remained quiet, being only disturbed by small night attacks; this cessation of operations was due to the want of information from the Government as to what further steps should be taken as the chief strongholds of the Jowakis were now demolished, and still they held out.

On the 14th an order was received for a second advance into the country, so at dawn on the 15th the troops started with five days' rations, the mules carrying four and the soldiers one, and marched into Pusthowni and bivouacked there. A part of the force was left at the Kotal, the place where the water divides in the middle of the Bori Pass.

The march to Woollai next day was very rough, though only 3 miles distance; then they had to go to Gulla Tungai, a mile further, where a piece of fairly level ground was found, a very secluded place where a small army might shelter unobserved. The troops bivouacked at these places. General Ross with his staff made a reconnaissance of the stronghold of Tor-Supper and its valley. This place Anglicised means black roof, because its roofs were annually burnt to drive the Tar Tirah men out of it, as they were interlopers.

The valley itself is as large as the Bori valley, and inhabited chiefly by the Kala-Kheyls; its elevation is 2,000 feet. On the 17th the party that went to survey Tor-Supper was met in a friendly way. On the 18th an advance was made of six miles through the Narra-Khula or Jowaki Pass; the road was very good, and half-way in the pass our force met and joined General Keyes, and the second column went on with his force and bivouacked at Jummo; there was constant firing that night, and some men were mortally wounded, and Major Rice of the Native Infantry was shot through the lungs.

Had the enemy on this occasion used any strategy our loss would have been great, as some parts of the pass were like a Thermopylæ, where a score of brave men might have withstood an army. On the 19th the troops went towards Kuhooi and bivouacked again in the Jowaki Pass. Another pass was discovered on this day named the Mundir-Khoola, supposed to be practicable for the passage of transport. On the 20th the march was to Jummo, this place was destroyed; the troops remained there night and day, then proceeded to Turki via Sheendeh, a distance of 10 miles, and remained at Turki, where the country is mostly flat, intersected here and there by small ridges of limestone rock.

On the 23rd the troops left for Kohat, a march of 13 miles; no resistance for the last three days.

On the 24th was the final march back to Shergosha camp through the Kohat Pass, a long march of 26 miles, passing by Aimal Chabootra and Mackeson. The expedition was now virtually over, as the General with most of his staff returned to Peshawar, and the main body of the troops was fast following. Some guns and some infantry were still left to hold the key of the position on the first ridge of the Jowaki territory in case of renewal of hostilities, and also pending the Commissioner, Sir Richard Pollock, settling the terms of peace with the Jowaki Chiefs.

In justice to most concerned it must be pronounced that the expedition was a most successful one. The last—in 1853—only advanced, as it were, to retire, for they never got beyond the first ridge, having damaged Bori they returned home. It was never dreamt in the strongholds of these mountain tribes that our forces could, as they did on this occasion, walk backwards and forwards through the length and breadth of their territory, go over their almost inaccessible heights and through their narrow rocky defiles and scatter ruin and desolation in their path. The success of our arms worked such a terror amongst these people that actually every man, woman, and child fled from the country and went into neutral grounds. Their sufferings on the whole must have been fearful, the dead and wounded in action, the deaths amongst their women and children from exposure in mid-winter on those bleak mountains, their cattle perished in thousands, the nullahs were choked up with their putrid carcases, and they felt terribly the destruction of large



quantities of their grain. Is there not truth in Charles Reade's assertion that all barbarians are poor, or did one of the chieftains lie when he said with tears in his eyes to the Commissioner at the Durbar, "You ask us for an indemnity of money for our misdeeds! Why, you have driven us from our homes, you have done all that you can do, there is now nothing left for you to do but to take our country."

Touching now upon the physical geography and the medical topography of this territory, it is evident that this narrow chain of mountains was an upheaval of the earth's surface when the Kohat district and the Peshawar Valley, which bound them on either side, were both under water, the confirmation of the land all round and its geology indicate this.

From Peshawar to the base of these mountains is a flat country 25 miles in extent, and the roadway, which ought to be of considerable importance, is very indifferent, although Peshawar is the arsenal of the north-west frontier, and this very road leads up to our outlying fort of Mackeson and branches off to the Kohat Pass. There are very few plateaux on these mountains, no places to locate troops such as at Cherat, they terminate in an abrupt ridge and slope down on either side with projecting spurs into a valley, and they bear the same configuration throughout.

The soil is of a loose, gravelly, sandy nature, intermixed here and there with red and green shale; but the chief structure of these ranges consist of immense ridges of hard limestone and sandstone projecting in every direction, and forming in many places large ravines and caves. The sterility of the country is remarkable, and with the exception of their small valleys, which contain rich dark clay soil with alluvial deposit, there is not a spot that will grow the commonest cereal. There are very few lakes or marshes, there are small rivulets intersecting the valleys, and there are many watercourses running through the narrow gorges of the mountains. The crops in the valleys are very limited, merely wheat and barley and a species of vetch. Stunted olive trees stud the sides and summits of the mountains, also the dwarfed acacia and wild myrtle; there are also clumps of wild grasses, and in the shady damp spots there are some handsome ferns. As Dost Mahomed said, "It is a country of rocks and stones," and we may add brigands and nothing else.

As regards the natural history no European has been allowed to go through the country, and it was too dangerous during the campaign to separate from the troops in order to find out the different species of birds and beasts. It is known, however, that there is a large amount of ground game, such as hares, also partridge and quail. There is a quantity of deer of the ourial species, and hyenas and silver foxes abound.

As regards diseases it is an extremely healthy country, the people living to an old age, we saw a great number over the allotted span of three score and ten. One of the fighting Jowakis that I saw was well on to 60 years of age, his arm was shattered by a Martini-Henry ball, and he had to undergo amputation, it was singular that his people left him on the field as it is a point of honour with them to remove their dead and wounded. This old Jowaki cursed his fate for having fallen into the hands of the Kaffre or unbeliever as he calls the British soldiery. There is some ague in their valleys in the drying up months after the rains, and being a filthy race, skin diseases are prevalent amongst them.

The troops found enough of good water in the mountain streams, but of course no food could be obtained in an enemy's country like this; the food they got was supplied by the commissariat, and was fairly good. The daily ration which consisted of 1 lb. of meat, 1 lb. of bread, some rice, tea, sugar, and salt, was sufficient. The meat was passable considering the untoward season of the year for feeding cattle. The bread was not unwholesome though not of prime quality either as regards its colour or taste, and was occasionally a little acid. Biscuits were seldom given in lieu of bread, and better had they not been given at all, as they are unpalatable and intensely disliked by the soldier, and are quite unsuited as an article of food after the hardships the men went through.

By a common consent, to cheer the men in their hardships during the piercing cold weather, and when they were out on the ridges bivouacking during torrents of rain, a second dram was allowed to them on payment, and seemed to do them good.

It would be idle to discuss what would be best for them where no other stimulant could be had, and two points in favour of this spirit is that it can be packed in the smallest compass, and it is eagerly craved for by the soldier.

To a man below par drenched to the skin, tea and beer are slow at setting him up, besides the latter being too bulky for the troops in the mountains.

There was a supply of firewood issued to the men besides the wood found on the camping grounds. The native followers of the camp cooked the food satisfactorily.

When the men lived under canvas one bell tent was portioned off to eight men, they had two blankets and a settringe or cotton rug each, and a great coat. When advancing to the front they discarded the tents, and one mule had to carry eight men's blankets and rugs,—their only covering besides their great coats when sleeping out in the open. The dusty coloured Khakees over the serge tunic was the daily apparel with a light helmet covered over with the same cotton material, an admirable dress on the whole for mountain warfare, so little distinguishable at a distance, so cheap and tolerably warm and enduring.

I suggested to Surgeon-General H. Ker-Innes, C.B., the principal medical officer of our forces in India, that, when bivouacking, the men should have, instead of one of their blankets and a settringe, a waterproof sheet 6 feet long by 3 feet broad, as is supplied by Mr. Hooper, of Pall Mall, to the London hospitals, as the blankets and settringe become saturated like a sponge when it rains and are very weighty, a matter of importance going up heights, and besides with such unsuitable covering it became a serious matter when the men were wet through and through and benumbed and shook with ague, and were in such a pitiable state that they had to return to a fort to refit; this would scarcely do in presence of an enemy like the Russian who scorns the elements. The waterproof sheet only weighs 1 lb. 14 ozs., the blanket and settringe weigh 8 lbs. 2 ozs., a striking difference, and besides, the waterproof is so easy to pack, and if it comes to a question of money I doubt if it would cost more, and unquestionably the great advantage is that it would keep the men dry.

This waterproof is white, and offering such a visible mark to the enemy is objectionable, but of course it could be darkly tinted. The booting of the men was not strong enough to stand the wet and rough work they had to go through, the heavy marching over rocks leaving some of them almost bare-footed.

As regards sanitary precautions when the force was halting and forming a camp or advancing the most advisable expedients for their health were had recourse to, as the General who commands and the medical officer who has charge have it impressed on their minds at every turn in India that the health of the soldier is the first law.

Their dress, food, and drink having been commented on, the sanitation of the camps and on the march must be alluded to. The positions of the camps were usually fortunate and well chosen, keeping in view strategical movements as well as sanitary. There was good surface drainage formed by the natural sloping of the sites. To the leeward and at a convenient distance proper trenches were dug for the burial of the excreta, and sentries were placed over the streams to hinder pollution of the water. All cattle, native followers, and native Bazaars were kept outside the cordon of the European camp.

I trust it will be seen that as regards the arrangements for the sick and wounded that the fullest provisions possible were made to meet all contingencies. To each regiment there were posted two medical officers, to each battery of artillery, and to each separate portion of a corps, one medical officer, besides their respective apothecaries and the complement of medical subordinates usual for field service.

A small bell tent was taken with each corps for the shelter of the wounded with a proper supply of medical wants and appliances, also tarpaulins and extra blankets.

Eor fear of any forgetfulness full instructions were issued to each surgeon, and men were told off and shown how to succour the wounded in the field, such as the manner of putting on tourniquets to stop hæmorrhage, or applying splints to broken limbs, or giving restoratives to a man sinking from exhaustion.

There were the necessary hospitals established, differing in size and equipment as the circumstances called for them, beginning from the front and ending in Peshawar.

There was the small tent at the rear of the scene of action on the ridges of the mountains, from which men were carried down in doolies or dandies to a larger establishment at the camp at Shergosha, at the foot of the mountains where they halted for further treatment, and then were sent on to the General Field Hospital at Fort Mackeson, where a regularly organised hospital with its full staff of medical officers and subordinates was established; there were beds for 30 patients always ready, and medical comforts and every thing that was needed. This fort was only 5 miles from Shergosha camp, and 3 miles from the nearest part of the Jowaki mountains; it contains fine lofty long airy rooms, very suited to the sick, and has the repute of being impregnable to any small force with small arms such as any of these tribes could bring against it.

When men in this hospital had so far recovered as to be out of danger they were sent to the dépôt hospital of the 9th Regiment at Peshawar, a distance of 19 miles; they made the journey in doolies, and were escorted by native cavalry, as this road even was not deemed safe from the enemy. At this Field Force Hospital there were 97 cases admitted, the light cases being treated at their respective corps. The per-centage of sick was 4.35. Zymotic diseases headed the list, 45 cases of ague, 13 rheumatism, and 9 dysentery; other cases, including wounds, range proportionately through the nomenclature of diseases.

The total loss of the combined forces from dead and wounded was 100. Some of the badly wounded, two men of the 9th Regiment and a gunner of the Elephant Battery, have recovered. Private Spenser of the 9th Regiment was wounded deeply through the back of the neck, the bullet entering in at the left side of the neck and boring under the trapezium muscle made its exit at the right side; from the nature of the wound it seemed to have been inflicted by a round ball. Private Edkins of the 9th had a deepish wound of the lower third of the left leg, caused either from a fragment of a tower when it was blown up or a ricochet ball. Gunner Ogden of the heavy battery was severely wounded in a close encounter with some Jowakis, he received several tulwar wounds, one extending 3 inches across the left side of the face an inch under the eye, another a most dangerous cut over the anterior brachial region close to the left wrist, very deep and 2½ inches long, injuring the arteries, severing the tendons, and destroying some of the branches of the median nerve. His arm has been saved but there is stiffness of the wrist and loss of the use of his fingers. A young officer of the 9th died from the great hardships. He caught a violent cold and fever followed which carried him off. Major Wilson, of the heavy battery, received a contusion on the left side from a ball.

Another officer of the 9th has been so ill from the constant wettings that he contracted very severe rheumatism and had to be sent to England. Surgeon Turner of the 51st was very ill with bronchitis and had to leave. I do not mention the officers who were dangerously wounded of the native army, their cases no doubt will be fully recorded by the surgeons of their regiments.

From the above it will be seen that the sickness of the force was not out of the usual proportion considering the trying times they went through, and shows that the sound and lasting material that was once the boast of our soldiers is still possessed by the present race, and if it were for nothing else but this one point alone, the Jowaki Expedition has been most valuable in refuting in these most anxious and depreciatory times the current notion that our men have degenerated.

When I received the order appointing me Senior Medical Officer of the British Force of the Expedition, I soon felt that this honourable position gave me no small anxiety and responsibility, fearing lest our department should fall in ought or that there should be friction in anything with which we were concerned. However, things went well and met with the approbation of the authorities,—Surgeon-General H. Ker-Innes, General Ross, and Dr. Alexander Smith, the principal medical officer of the Peshawar circle, in fact the General when he was thanking the army in his orders complimented us very handsomely for our services.

I must now mention in conclusion that Surgeon-General Ker-Innes took great interest in this Expedition, deeming it the test that just now is anxiously required as to the fitness of our soldiers as regards physique for hard work.

The Surgeon-General gave me every assistance and adopted my suggestion about waterproof sheets being in future served out, and he also informed me he would have been here on the frontier to witness our arrangements had it not been that most onerous duties on hand detained him.

Dr. Alexander Smith, Deputy Surgeon-General of this circle, drew out a full length programme of organisation, and he did not leave a stone unturned, in as far as his power lay, to grant me all I required. I have to thank General Ross and his staff for their ready acquiescence in any views I entertained for the benefit of the soldier.

To the medical officers under me I am much indebted for their good services, more especially to Surgeon-Major Walsh of the 9th Regiment, and Surgeon-Major Creagh of the artillery division.

The Commissariat aided me in the transport, the hospital and the sanitary arrangements without let or hinder. The cruel aspersions cast on them by some anonymous correspondent of the press can scarcely be understood in the face of the difficulties they had to contend with, and in due time, overcame.

Every allowance should be made for the unforeseen accident of the bursting of the bridge over the Indus at Attock, which delayed their reinforcements of transport. That the men were kept without their rations on two or three occasions longer than was usual is scarcely a matter in those trying times to allude to,—much less complain of.

I must now urge as a plea for the length of this report that the Expedition has caused some sensation at home and in this country, because it was feared had there been any mistake in our military operations, had we been worsted at any one point and lost many men, the whole of the Afreedi tribes would have risen against us, and as the English press justly observes, through the great caution, clever tactics, and long experience in mountain warfare of Generals Ross and Keyes, with little bloodshed on our side, the country has obtained a signal success against the tribe of the Jowakis and averted a great frontier war.

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## APPENDIX No. V.

## THE PROGRESS OF MILITARY PRISON HYGIENE IN IRELAND.

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By Surgeon-Major A. A. GORE, M.D.

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THERE are few duties upon which military surgeons are employed which do not present some features of interest worth recording. Of these there are perhaps none so instructive as the history of the attempts made from time to time to ameliorate the condition, while at the same time rendering more effective the discipline, of our soldier prisoners in this country, until now unrecorded in our annual reports.

Dublin affords peculiar facilities for studying the salient points illustrating different forms of prison construction. Behind Palatine Square, Royal Barracks, is the oldest military prison in Ireland, now devoted to other uses, but little altered from its original form. These barracks were completed upon the Vauban principle, in 1704, for six regiments of foot and five troops of horse. The walls of the prison are, however, of much older date, bearing out the tradition handed down in one of the histories of Dublin, that here was interned, in the reign of the second Charles, the notorious Colonel Blood, at which time the garrison of Ireland did not exceed 7,000 men of all arms. Here were also confined Wolf Tone and other celebrities of the Rebellion of '98; so that its now mouldering walls, alluded to by Madden and Froude, have an historical interest second to few of the old buildings of the Irish capital. What tales these walls might tell if they could only speak!

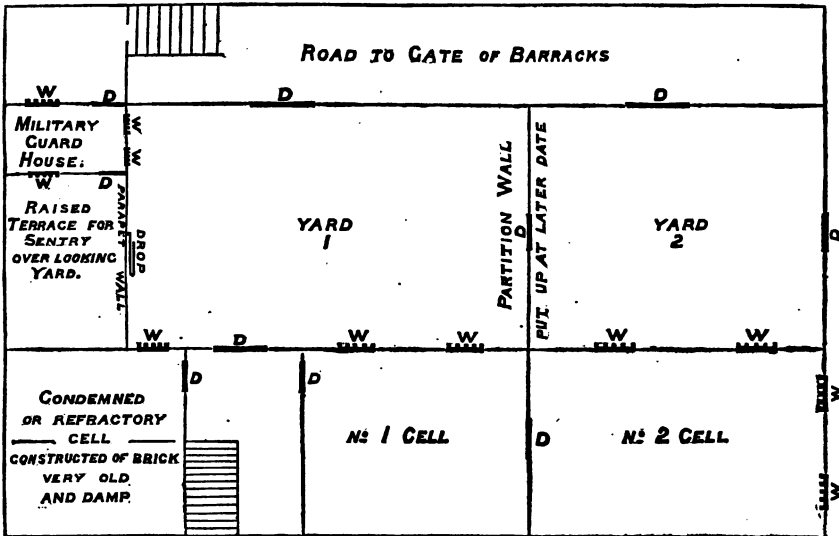
In the early part of his military career, Dr. Renny, first and last Director-General of Hospitals in Ireland, spent a considerable portion of his time here. One of the ablest and not least distinguished of our soldier surgeons, he was for many years medical officer to this prison, and ever evinced a peculiar interest in its sanitary condition. It was styled in those days "The Soldiers' Prison," and a reply to the Military Secretary, dated 24th May 1798, with reference to the early arrival of French prisoners of war in Dublin, contains now the earliest notice of its existence in official records:—

"The Provost Prison of Dublin was built many years ago for the sole accommodation of British and Irish deserters. The lower part of the building consists of two cells, 24 feet by 20 feet each, and the upper is inhabited by the deputy provost-marshal, except one small room which until lately has always been used as a temporary hospital. The prison is surrounded by a high wall, enclosing a space of 80 feet by 40 feet, and being built against a bank of earth the cells are always damp and very badly ventilated. With these local disadvantages it has been found by experience that whenever the number of prisoners exceeded 50 it required the utmost possible exertion of white-washing, fumigation, attention to personal cleanliness, &c., &c., to prevent the propagation of infectious diseases amongst them. In addition to the above description of prisoners, since the end of April last there has been shut up in this uncomfortable place on an average from 100 to 150 persons charged with treasonable offences, 50 of whom were laid in tents pitched in the yard, and the remainder in two cells and the upper rooms heretofore used for the reception of the sick; and had not the weather been uncommonly dry and fine during the summer, so as to admit of the prisoners being kept almost constantly in the open air in the daytime, their health could not have been preserved in any tolerable state by the strictest regulations, as those only whose duty it was to visit the prison daily could form an adequate idea of the heated and uncomfortable state of the lower cells whenever the prisoners could not remain in the yard."

The following rough plan which I have made of this interesting old place will give a general idea of its original construction and of the soldier prison of the 17th century:—

OLD "SOLDIERS' PRISON," ROYAL BARRACKS.

Original Ground Plan.



*Note.*—Originally there was only a single yard; partition walls put up later on, recommendation of Dr. Renny, to separate deserters from prisoners of war and insurgents of '98 and 1803. Above the cells shown in the ground plan are three similar ones, and a third or rather second storey, probably the one occupied by the Provost-Marshal.

Commenting upon the danger which must attend any further delay in remedying the state of things described as existing in 1798, Dr. Renny made the following proposals for his Excellency the Lord Lieutenant's consideration, viz. :—

1. That the Provost Prison of the garrison should be, as heretofore, reserved for the confinement of deserters.

2. That a house should be immediately procured, as convenient as may be to the barracks, for the safe confinement and suitable accommodation of all persons charged with treasonable offences until they be legally discharged or otherwise disposed of.

3. The management of this temporary prison to be entrusted to a person of character and experience, and every part of its internal police be put under strict regulation.

4. A small infirmary to be annexed to the building, protected by a military guard, and the medical care of the sick entrusted to a hospital assistant appointed by Government for that special purpose.

He concludes, "I feel myself bound to give it as my most decided opinion, "that humanity to the individual as well as a due regard to the health of the "garrison absolutely requires that it should be carried into immediate effect." In consequence of these pressing recommendations the old gaol at Kilmainham was on the 27th September 1798 appointed for the reception of such prisoners as could not be conveniently accommodated in the Provost Prison. Still so great was the pressure for space in these troublous times, and the overcrowded condition of the establishment under his immediate care, that Dr. Renny, on the 19th October, wrote to the Lieutenant-General Commanding to request, that

he would have the goodness to visit the prison, where he would see "a prodigious number of persons crowded together in a very miserable and uncomfortable state, and with the smallest accommodation for the relief of the sick." By a subsequent arrangement all prisoners, not deserters, and who were in future taken into custody on suspicion of treasonable offences, were to be confined in a prison on Usher's Island on the opposite side of the river, under the charge of the surgeon of the invalids in garrison, who was allowed additional pay in consideration of his special charge, and permission to charge annually the cost of medicines expended under the supervision of the Director-General of Hospitals.

The principal prison establishments were at this date at Cork, Waterford, and Dublin,—depôts periodically relieved by the deportation of their inmates to the West Indies or New South Wales.

At New Geneva Barracks recruits were collected previous to their being sent over to Chatham, and deserters condemned to service in Jamaica and the Carribean Islands. Prison ships lay off Duncannon Fort and in Cork and Dublin harbours. The crowded condition of some of these ships is in contemporary documents sometimes referred to; "The situation of the prisoners on board the 'Princess' (in Cork Harbour) becomes daily more pitiable," writes Sir James Stewart, "as contagious disease rages with great violence, and carries off a great number, notwithstanding the precautions which have been taken to stop its progress." The sick were returned from the ships and transferred to colliers, yet the fever broke out again, 35 cases occurring within a very short time. This was in 1798.

The first real attempt to mitigate these crying evils took place in the year 1800, when the Irish Medical Board urged "That the building of a new Provost for the garrison of Dublin on an enlarged and judicious plan appeared a most necessary work," and "that its situation should be as contiguous to the barracks as possible." A place was purchased by Mr. Gibson, the Government architect, for the proposed building, and a board ordered by his Excellency the Lord Lieutenant to "investigate the matter and to suggest such regulations concerning the same as might in their opinion be most calculated to remedy the evils now existing, to point out the means of checking abuses, to alleviate the sufferings of this class of people from the irregular and inattentive mode now in use in regard to them, and to place the whole upon one solid and impartial system." Dr. Renny was selected to be one of its members, but what their recommendations were I have been unable to discover.

In the following year (1801) the medical superintendence of the New Geneva Prison depôt was transferred from the English to the Irish medical staff, and we may form some idea of the extent of this establishment when we find five transports taken up to convey convicts and deserters from there to the West Indies. The English establishment had consisted of one staff surgeon, six hospital mates, one purveyor, and one purveyor's clerk. Upon its coming into the Irish establishment the following plan was drawn up for the future regulation of its medical department. Regulations signed by Dr. Renny, and of some historical interest:—

1. Staff-Surgeon Eagle to be entrusted with the entire control of the establishment, receiving his orders exclusively from the Irish Medical Board.

2. One hospital mate with Renny's commission, in addition to the two now doing duty, to be appointed permanent assistants to that office at 7s. 6d. per diem, consolidated pay. Two to be stationed at New Geneva, and one at Duncannon Fort, the latter to take care of the sick of that garrison, and those usually confined on board the "Princess."

3. Two hospital mates without Renny's commission at a consolidated salary of 7s. 6d. per diem, to be stationed at New Geneva, in constant readiness to attend on deserters sent from New Geneva to Chatham by sea, an embarkation which usually takes place four times in every year.

4. As embarkations from the prison for the West Indies occur only once a year, temporary medical assistance for this service when required to be provided. The hospital mate brought forward being allowed a pay of 10s. per diem from the date of his appointment to his return.

5. The medical board, in conformity with general usage, to appoint through Staff-Surgeon Eagle temporary purveyors, nurses, orderly men as the medical

exigencies of the prison may require, 5s. to each purveyor, 1s. to each nurse, 6d. to each orderly man if a soldier, and 1s. if not.

6. Medicaments and surgical appliances to be supplied by the Medical Board.

7. Wine, vinegar, tea, rice, and other extra articles for the sick during the voyage to be procured, as occasion may require, by Staff-Surgeon Eagle, and to be included in the annual hospital account, discriminating between convicts and recruits.

8. For the future the recruits are to be kept apart from the convicts in the depôt. Their "sick reports" and accounts to be furnished perfectly distinct from each other.

9. The sick reports of the Duncannon Hospital, invalids, Dutch troops quartered in Wexford and New Ross to be, as heretofore, on a separate paper.

10. Upon the arrival of the officer of the Irish Army Medical Branch at New Geneva, the British medical staff will return to England.

11. The following monthly sick report for the New Geneva depôt to be furnished to the Army Medical Board in Dublin :—

—	Total Effectives of each Class of Prisoners, including Sick.	Sick divided into Six different Classes of Disease.						Total of Sick.	Remarks.	
		Acute.	Chronic.	Convales- cent.	Veneral.	Sore Legs.	Punished.			
<i>Irish Side.</i>										
Deserters -	-									
Convicts:—										
(a.) Males -	-									
(b.) Females -	-									
<i>English Side.</i>										
Recruits -	-									
Convicts:—										
(a.) Males -	-									
(b.) Females -	-									

These are the first regulations relating to soldiers' prisons in Ireland which I have been able to find, and to-day they might be quoted as a model. They show conclusively that at this time everything connected with the medical affairs of the establishment were in the complete and entire control of the medical department represented by the staff surgeon in charge.

It was found about this time that the establishment of a permanent hospital for fever patients on board the "Princess," from the peculiar confined nature of the accommodation, was accompanied with great mortality and the means of almost continuously propagating the above fatal disease amongst the prisoners. In consequence of this the hospital was removed to the garrison on shore at New Geneva, after which the acute diseases were, according to Bond, "much lessened and the deaths inconsiderable." This ship had come round from Cork Harbour, where she lay in '98 and '99, as previously described. There she had been cleaned out and thoroughly fumigated and limewashed on the recommendation of Dr. Haig, Physician to the Forces. In the former year we are told that in some of the southern gaols "numberless putrid fevers" and other bad disorders were the attendants on all prisoners confined to gaol "during the very hot seasons."

The scheme of diet upon which prisoners proceeding on long voyages were at this time victualled by contract amounted to about two-thirds of seamen's allowance, and was in the opinion of Sir Gilbert Blane, who wrote a memorandum on the subject in 1801, "upon the whole very judicious both as to quantity and choice of articles, and was quite sufficient for people of whom no labour was required." He, however, suggested some alterations which in his opinion and experience would be advantageous:—

1. The substitution of brown sugar or molasses for such perishable articles as butter and suet. Of the former he writes, "These articles are very anti-



"scorbutic and non-restoring, whereas *all fat substances are unfavourable to the scurvy* and some become rancid in hot climates.

2. An equivalent in rice on two of the three days on which peas are issued, reserving the peas only for the day on which porter is served.

3. Half a pint of vinegar thrice a week to each mess of six persons, *i.e.*, on the days on which beef and pork are used, and that the baking of soft bread should be encouraged.

4. With regard to clothing, each to have a spare shirt in his own possession that he might shift himself once a week. An ample supply of needles and thread for the repair of clothes, which should consist of a coat, waistcoat, trousers, stockings, shoes, neckcloth, hat, &c.

5. "*Cleanliness is the means of Health.*"—The decks should be kept clean chiefly by daily sweeping and scraping; frequent washing should be avoided, particularly of the lower decks, as it is more difficult to dry them. Dryness is essential to health, which is promoted by the use of movable stoves in case of dampness, whether from weather or washing. There should be a full supply of such stoves, brooms, and scrapers. As the sides of the ships may become contaminated by the foul vapour from the men's bodies, and other sources of infectious diseases which have been known to cling obstinately to them, it would be advisable to whitewash the sides and the decks overhead about once every month with quicklime thrown into hot water.

6. Shifting and washing of the person should not be seldomer than once a week, catching the rain-water as often as possible for this purpose. Hammocks and their contents should be carried every day upon deck to be aired in fine weather, and as many of the prisoners as may be safely brought up into the open air. Without attention to these two points of cleanliness infection may arise though ventilation should be carried fully into effect.

In the instructions to the surgeon in charge he was directed "to go daily among the prisoners, whether with a view to discover their complaints and particularly to examine if any of them were affected with fever, flux, or scurvy, in order that early and effectual means may be taken to stop the progress of these diseases," and "when men with infectious diseases enter the hospital he was to take care to have their clothes stripped off; their hair cut close, and to cause them to be washed, if possible, in a bathing tub, or if this could not be done to have their face, hands, and feet well washed with warm water and soap. The shirts, trousers, and stockings which they threw off steeped for some time in cold water before they were handled and washed, and the coat and waistcoat exposed to the fumes of sulphur, if this could be done, and, if not, to allow them to be exposed to the open air for two or three days before they were stowed away, and that the utmost cleanliness be observed both with regard to the hospital and the prisoners' persons, and that as much purity of air and free ventilation be studied as may be consistent with due warmth. Dryness should also be particularly attended to, for which purpose, as well as for warmth and for promoting a renewal of air, an airing stove with embers should be frequently carried to different parts of the hospital."

These admirable practical instructions of Sir Gilbert Blane's can be little improved upon even at this distant date. On the 13th August 1802, Mr. Dockery, medical superintendent of the corps of invalids in Ireland, was appointed to assist Dr. Renny in discharging the then "laborious medical duties of the prison." After the rising of 1803, a considerable number of civil prisoners were again incarcerated in the Provost. On the 12th December Dr. Renny again submits a plan and estimate for its improvement, stating that it had been represented by him for some years past "from its local site and structure to be most dangerous to the health of the prisoners confined therein, and as they are at present under very uncomfortable circumstances." In April 1805 orders were given to fit up, in the upper part of the "Old Provost," a dozen bedsteads with beds and bedding for the treatment of such deserters as might be punished and confined there. Exactly a year afterwards a ward in Stephen's Hospital was fitted up for the accommodation of the deserters confined in the infirmary of the Provost under cure for sore legs. Shortly afterwards two deserters escaped from the hospital, resulting in the trial of the sentinel on the room at the time, a private of the 2/48th, who was sentenced to receive 500 lashes. It was then recommended to re-occupy the hospital of the Provost for such cases, but upon Dr. Renny pointing out

"That it was not found to answer, as the ulcers on the legs of the deserters confined there degenerated in the course of a few days so much as to assume the appearance of hospital sore, principally occasioned by the confined bad air, the Old Provost being in every respect a damp, confined, miserable prison," while the men removed to Stephen's Hospital were speedily cured. The idea appears to have been abandoned for the time, but the infirmary of the Provost appears to have been occupied again in 1807, there being an order on record, dated 31st October, approving of an orderly man being employed in attendance on the sick, and giving authority to the provost-marshal to charge 1s. per diem in his contingent for the purpose. At this time it was the custom for the provost-marshal to recompense regimental or staff surgeons, whenever a deserter was confined in their hospitals, at a rate of 6d. per diem.

Many of the prisoners confined in the Provost of the garrison were then men who would go to any lengths to procure their discharge from the army. In a paper found upon a private of the 45th confined in the Provost of Dublin in 1807 was given at length a receipt for procuring a rupture, for which the writer paid 2s. 2d. His letter to his comrade commences "I don't know what to say about your leg; I think it would be better to let it get well at once, for they will keep you there time out of mind until you are wearied out of your life, and if you had not taken Hickey's advice you would get a better remedy to lark the discharge." In the following year a deserter of the 1/5th Foot is tried for running a needle into a fellow prisoner's eye, "who would frequently go round the hospital showing his eye to the prisoners, boasting that he would out-do the doctor; one day in particular, after teasing his eye, he lay down on his back and called Pat Tookey, a deserter from the 2/18th Foot, to look at his eye, upon which Tookey exclaimed, 'By God, he was as blind as the sole of his shoe,' and so on, so that the post of medical officer was scarcely a sinecure. Corporal punishment and deportation were then almost the only forms of punishment inflicted upon military offenders. To the Director-General of Hospitals in Ireland is due the honour of making one of the earliest, if not the first, attempt to introduce a more humane system into practice, and one now known as the "separate system," very generally adopted throughout the prison service and considered by many competent judges the best. On the 27th October 1807 Dr. Renny addressed the following letter to the Military Secretary, Lieutenant-Colonel Gordon:—

"SIR,

"As the statement which I had the honour of submitting to the Commander of the Forces some time since, on the subject of substituting solitary confinement for corporal punishment in the British army, was favourably received by his Lordship, I beg leave to propose that I should have authority to build a prison for the use of the garrison of Dublin agreeably to the plan annexed to said statement, the expense of such building to be defrayed from the surplus hospital fund of certain regiments which have left this establishment, lodged by me in the Bank of Ireland, and which at present amounts to the sum of 1,474l. 2s. 3½d.

"Should this proposal be agreed to, I shall bring forward a regular plan of the building, with an estimate of the expense for approval before I proceed to erect the prison, which, in my opinion, may be most conveniently placed at Arbour Hill, on a vacant piece of ground adjoining the six new regimental hospitals.

"The propriety of commencing an experimental measure of this kind in Dublin previous to its introduction into other quarters of Ireland is too obvious to require discussion, as the garrison is sufficiently large, and I fear sufficiently dissipated, to allow a trial to be made on a large scale to ascertain how far vice can be punished and discipline maintained by abstinence and seclusion, without resorting to the frequent and painful infliction of corporal punishment. The residence of the Commander of the Forces on the spot, and the sanction of his name and high authority will at the same time obviate many difficulties which must be expected ever to accompany the enforcement and execution of a new project, however plausible or however well intended it may be. Although I am well aware of the nature and extent of the measures which I propose to undertake, and though the necessary advocating of my official employments are already so extensive and laborious, as I ever wish them to be, still the

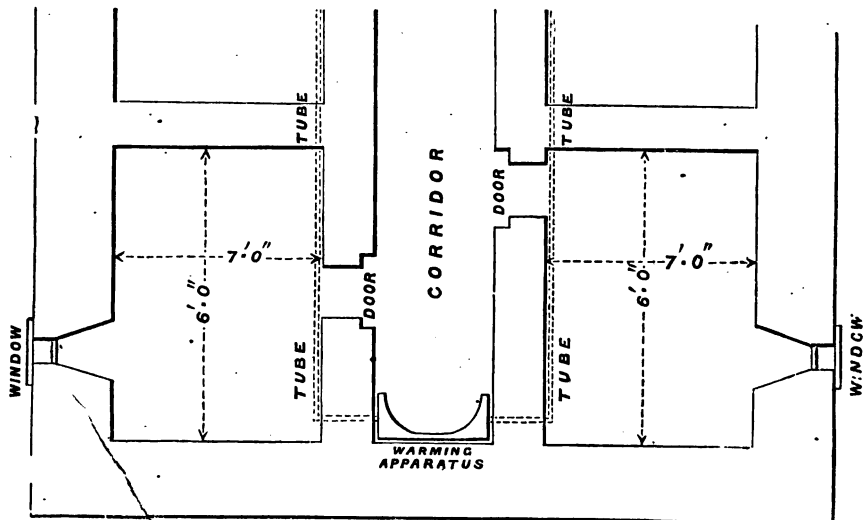
beneficial effects which I think may be reasonably expected to accrue to the British service by the establishment of this discipline are so strongly impressed on my mind that I cannot help offering myself as the humble instrument of forwarding so good a work."

It was not until 1811 that a new clause was introduced into the Mutiny Act empowering courts-martial to imprison, instead of inflicting the punishment of flogging, a humane enactment anticipated by four years by a member of our service and profession.

About this date there was a naval hospital in Mecklenburg Street for the reception of any sick impressed men from the ships in the basin, under a guard consisting of a corporal and six privates. As the duties of the garrison had become so severe as to give the men scarcely three nights in bed, a proposal was made to have the sick sailors transferred to the hospital of the Provost, which was objected to by Dr. Renny on the ground that the "distance of the Provost from the tender formed of itself a strong objection to receiving sick impressed men into the hospital of the prison, which, to prevent contention between different descriptions of persons, ought to be used solely for what it was built originally, to keep in safe custody Irish deserters from His Majesty's land forces." He, however, suggested that "The eastern unoccupied part of the Provost might for a time be appropriated to the purpose suggested by Lieutenant-General Sir Charles Argill," the two sides of the gaol being completely separated from each other by a partition wall.

An order was issued early in the year 1813, directing all deserters to be medically examined before leaving for England, so as to avoid sending men across who, upon arrival, were found to be wholly unfit for service. In this year commenced the erection of prison cells, which were to be added to each barrack in Ireland. Those at Richmond Barracks were the first of their kind erected. A brief description of these will be, therefore, of interest, as well as of the improvements recommended in their construction by the Director-General of Hospitals. The house built by the barrack architect consisted of two storeys, each storey comprising a central corridor ventilated by windows at the end, and from which corridor six cells went off at each side, all of which had cross ventilation by means of two small openings through the outer and inner wall. There were two fireplaces on the ground and two on the first floor, and the entrance and staircase was placed in the middle of the building.

The plan below shows two of these cells and plan for warming proposed by the architect.



Superficial area of cells or floor space, 42 square feet each.

After a minute examination of the several parts of this new prison the impression made upon Dr. Renny's mind was that the cells were too small, and by no means such, as to structure or relative situation, as to afford the means of inflicting solitary confinement with safety to health, or with the prospect of amendment of morals, more especially in cases where it became necessary to continue the punishment for some length of time. He sketched out a plan, the effect of which was to turn three of the cells into two, which would enlarge their dimensions from 6 feet by 7 feet to 9 feet 6 inches by 7 feet, or from 42 to 67·2 square feet, and further recommended "That a window sufficiently large to admit *light* as well as *air* should be made in the external wall of each cell, as near as possible to the top of the arch, and that an opposite window should be broken out above the door, or on each side of it, into the corridor at the same height, to secure a sufficient current of air through the apartment, with glazed and hinged sashes, to open and shut as may be convenient," and "As the persons confined will very generally consist of young, healthy men, they only require a place perfectly dry and well ventilated, with sufficient space to move about in; I much fear, therefore, that the running of stove pipes or flues of any kind through the cells, as at present constructed, would make them too hot, and tend to enervate the constitution and injure health, and they are less necessary because the fireplaces will in my opinion diffuse a sufficient portion of heat through the whole building. In order, however, to make the ground cells as dry as the others, I should recommend the earth being excavated out of them, and arching the floors, which would secure them from damp and exhalation of moisture, there should be a fixed seat in each cell of metal or wood, and the hammock beds (which I have seen) I think a good contrivance and particularly suited for barrack prisons. After a long experience of the construction of hospitals, and some knowledge of gaols and lunatic asylums in which prisoners and patients are very generally confined in separate cells and apartments, I am clearly of opinion that for all such purposes *single buildings* are to be preferred to double ones, and if corridors are admitted they ought to be placed in the front. The erection of such buildings to contain equal numbers will certainly be somewhat more expensive in the first-mentioned plan, but this will be *amply repaid in the end by securing thorough ventilation, more space, healthy accommodation*, combined with the necessary degree of solitary seclusion, and the corridors in bad weather will give a facility to allow prisoners who may be confined for some length of time, and whose health may be delicate, to stretch their limbs and to take occasionally a certain degree of exercise—a matter not without its advantages—and which should not be lost sight of in prisons where at some period a good many individuals may from necessity be confined at one time." These suggestions met with the warm approval of the authorities as being "highly judicious and deserving of adoption," and it was ordered that "previously to any more of these prisons being proceeded with, the plan of them was to be forwarded to the Commander of the Forces, in order that he might thereby be enabled to enter a medical opinion on the same."

"These prisons," writes Dr. Renny in the following month, "ought to bear a certain proportion in point of size to the magnitude of the garrisons to which they are respectively attached. The probability is that in garrisons situated in or close to large towns offenders against military order may, at times and under peculiar circumstances, be numerous, while in barracks placed in country situations, where soldiers are more out of the way of every sort of mischief, a small number of men only will render themselves obnoxious to punishment of any kind." He forwards a plan for a new form of prison, and suggests that the first of them should be erected in the capital by way of experiment on the piece of ground contiguous to the regimental hospitals on Arbour Hill, surrounded by a wall and then used as a garden for the hospitals, and which being in a high, airy situation and adjacent to the Royal Barracks promised many advantages of site which could be wished for. It was supposed that a two-storeyed building providing for 30 prisoners and a keeper, and which was estimated to cost 3,210*l.* 7*s.*, "would be the most extensive building required." This plan and the site selected by the Director-General of Hospitals was approved of, and upon the latter was shortly afterwards erected the present Provost Prison, in immediate propinquity to the

present married quarters on Arbour Hill. The original ground plan gave a floor space of 84 square feet to each cell, and a cubic space of 840 in the lower and 924 in the upper range of cells. I am inclined to think, however, that Dr. Renny's admirable plan on the separate system—a single row of cells, well ventilated and lighted, with a corridor warmed by fireplaces in front and a yard behind, thus admitting of cross ventilation—was departed from, for I find in 1845 the Provost disrated as a building arranged upon the association system, the prisoners of the third class sleeping in a large room, and during the day-time employed at hard labour in sheds, and a light description of shot drill. There was a guard room for a prison guard, a provost-marshal's office, four dark cells perfectly secluded from the others, ten light cells for solitary punishment, the reception of the sick, and men coming in "infected with itch." In the upper storey were two large apartments fitted with wooden guard beds for the first and second classes in the same manner as the room below, a tailor's shop, and an apartment for the warders on night duty. In the yard behind was the cookhouse, pump, latrines on the cesspit system, &c. There was no prison dress, the men paraded in their ordinary uniform, with stocks and clogs, they were divided into classes and subsisted by the provost-marshal, who received a fixed sum according to the class of each inmate. Corporal punishment, solitary confinement, and reduction of diet were the chief means resorted to for the maintenance of discipline. Convicts or men sentenced to penal servitude awaiting their removal, and deserters, were confined in a lock-up room under a strong guard, and only allowed to move about in charge of specially selected sentinels. The guard beds sometimes "swarmed with fleas." Before the organisation of these provost prisons, a great number of soldiers were confined in the bridewell or common gaols of the country, when they were associated with the worst characters, and were under very imperfect discipline. The chief punishment consisted of breaking stones, raising a certain quantity of water daily, and the treadmill. There was no punishment diet, as each inmate of these establishments had a meat dinner three times a week, and soup on the other three days, if under sentence for three months, and a soup or meat dinner every alternate day if confined beyond that period.

The next change in prison construction was the introduction of the district military prisons upon the Jebb system. The first of these was commenced in Dublin in 1846, after the model of Pentonville Prison. According to General Jebb, the main points to be considered in the construction of a prison were—

1st. The site.

2nd. The general arrangement and disposition of the component parts of the building, with a view to security and convenience.

3rd. Those further details which may be applicable or requisite for the enforcement of the particular system of discipline which it is intended to carry out.

Either 1st. The *associated system* in operation in some prisons, based upon a classification of prisoners; 2nd. The *silent system* in which prisoners are associated for labour or exercise during the day, and sleep in single cells at night; or 3rd. The *separate system*, in which each individual prisoner is confined in a cell, which becomes his workshop by day and his bedroom by night.

It is now generally held that the individual separation of prisoners from one another—advocated by the philanthropist Howard, Dr. Renny, in Ireland, and the Duke of Richmond, and the advantages of which were brought under the notice of Government in 1837 and 1838 by Mr. Crawford and Mr. Russell, inspectors of prisons, and adopted in the construction of Pentonville Prison in 1842, after the model of which was erected the Military Prison, Dublin, in 1847, carried out to a great extent by the Americans, and advocated successfully by MM. Beaumont and de Toqueville in France, and Dr. Julius in Prussia, and adopted *de rigueur* in Belgium—is the only basis on which any sound system of prison discipline can be framed, because it prevents the possibility of contamination, is a severe punishment on account of the inmate being alone, and because it affords the well-disposed prisoner an opportunity of reflecting upon his past life and of its consequences, and of forming some rational reflections for the future.

With regard to site, Major-General Jebb laid down that it was desirable that a prison should be built in a dry and airy, and, if possible, in an isolated situation, the former conditions being conducive to the health of the prisoners, and the latter to their quiet and seclusion. It should not be overlooked by ground or buildings in the immediate neighbourhood, and the situation should also be removed beyond the influences of any noxious or prevalent local fogs, and should be sufficiently elevated to ensure a perfect drainage. The general disposition of the buildings should be such as to combine security, facility of access to all parts, and the utmost convenience for carrying on the discipline of the prison with a limited number of officers, which important objects were best obtained (in his opinion) by laying out the different buildings and distinct portions of which a prison is comprised so that they should diverge or radiate from a common centre, a point of observation commanding a general view of the whole, with a boundary wall 18 to 20 feet high above the ground, and foundations of such a depth as to prevent them being undermined in the course of a single night. The wall should present an even smooth surface on both sides, the coping of the top being smooth and semi-circular, and it was desirable to have only one gateway, and this opening into an enclosed courtyard; the officers' houses being contiguous and overlooking the prison, so that the interior might be better watched, and an additional security against escape obtained.

To the Act passed in the year 1839 (2 & 3 Vict. c. 56.), rendering it legal to adopt the separate confinement of prisoners for any length of time to which the sentence extended, was appended the following very proper and humane conditions, viz., "Provided always, that no cell shall be used for the separate confinement of any prisoner which is not of such a size, and lighted, warmed, and ventilated, and fitted up in such a manner, as may be required by a due regard to health, and furnished with the means of enabling the prisoner to communicate at any time with an officer of the prison," and "That he should have the means of taking air and exercise when required, and be furnished with books and the means of moral and religious instruction."

Under such a system the cell "must be of such a size to admit of the prisoner being employed a portion of his time in manual labour" (Jebb).

When the discipline of separate confinement originated in England, the proper size of the cells was fixed by Act of Parliament in the year 1778 (19 Geo. 3. c. 74.) This Act enjoined that they should not exceed 12 feet in length by 8 feet in breadth and 11 feet in height, nor be less than 10 feet in length, 7 feet in breadth, and 9 feet in height; or

1,056 cubic feet of air space (maximum),  
630 (minimum).

Major-General Jebb thought "a cell 13 feet long by 7 feet broad and 9 feet in height—equivalent to

819 cubic feet of air space,

would be sufficiently large for prisoners undergoing long periods of separate confinement. Dr. Renny's typical cell, 12×7×10 would afford

840 cubic feet of air space

as a minimum. M. Chatel recommended in 1841 that cells for separate confinement should be 4 metres long, 3 metres high, and 2·25 metres broad. The cells in the Military Prison, Dublin, originally constructed for terms of imprisonment not exceeding six months in duration on the silent system, contain a little over 600 cubic feet of air space. The cells in the New Prison at Kilmainham are 13 feet long, 7 feet wide, 11 feet high to the groin, yielding a superficial area of 91 square feet, and a breathing space of 990 cubic feet. The Barrack Commissioners recommended that no prison cell should contain less than 1,000 cubic feet of air space in *all newly erected buildings*, and this is in accord with modern opinion and my own experience of very many kinds of cells. Major-General Jebb very properly insisted that "the proper ventilation and means of warming the cells when necessary" were "objects of primary importance to the health of the prisoners, and demanded the most serious consideration." Major Miller, formerly Superintendent of Military Prisons in Canada, made the following excellent remarks on this subject in a report to the government of that province in 1855:—

"The size of the cells suitable for the confinement of prisoners should be regulated as follows:—

1st. The means of ventilation.

2nd. The occupation of the inmates.

3rd. The terms of imprisonment.

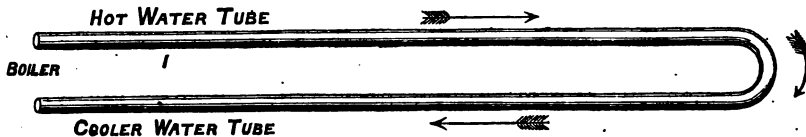
"When the ventilation is perfect smaller cells may be more safely used than when it is imperfect. When the inmate is constantly employed during the day at outside labour, he naturally will not require so large a cell as the prisoner whose occupation is indoor work; it is also evident that prisoners committed for short periods may with more safety be confined in smaller cells than those undergoing long periods of imprisonment."

In the ventilation of a prison, according to General Jebb, the objects to be attained are—

1st. The regular supply of a sufficient quantity of fresh air, and, when necessary, of tempered air, into each cell, without subjecting the occupier to any inconvenience from draught.

2nd. The withdrawal of a like quantity of foul air.

These principles were first worked out at Pentonville in 1842, and subsequently in the Military Prison, Dublin, by placing in the basement of the building a boiler or hot water apparatus so disposed that the heated water might flow through a pipe fixed at the top, and as it gradually became cooler by imparting its warmth elsewhere, might return by another pipe to the bottom of the boiler, the circulation being thus complete, the motive power which maintained the current being the *difference in weight* of the column of water in the *flow* and *return* pipes, which caused an unequal pressure on the points where these pipes were inserted into the boiler, and so induced the circulation. The large proportionate area of radiating surface deriving its temperature from the circulation of the hot water producing, according to the inventors, the effect required in the coldest weather, when that surface was meantime at an average temperature of about 100° to 120°; under ordinary circumstances 80° to 100°. These tubes run in arched passages under each corridor, the one



above the other, the upper tube carrying the hot water from the boiler, the lower one returning the cooled liquid to be re-heated. The fresh air is introduced through a large cold air flue, passes over the boiler and pipes situated under the corridor, ascends the lateral small flues communicating with the cells, and enters the latter through the grating over the door. The object of making the point of entry at the top of the cell and diffusing it through the grating on an extended surface being the avoidance of unpleasant draughts on to the occupier, so that he might have no inducement to frustrate the intention of ventilation by stopping it up. The foul air is extracted through a grating placed close to the floor of each cell, on the side next the outer wall, and diagonally opposite to where the fresh air is introduced. This grating covers a flue, which passes up the outer wall, and communicates with a main foul air flue placed in the roof; the main foul air flue terminating in a ventilating shaft rising above the top of the building. The same flues are made use of for ventilating the cells both in winter and summer, the only difference being that during summer, when air is introduced into the cells at its natural temperature, a fire is lighted when necessary in the ventilating shaft, and during winter, when the temperature of the air must be raised, a fire is lighted in the heating apparatus below, the smoke and disposable heat from which being discharged into the shaft, answered the same purpose. By means of the system of flues which has been thus briefly described, a communication is established, first from the outer air, through the warming apparatus, to the top of each cell, and then from the floor of each cell upwards through the extracting flues and ventilating shaft into the outer air again.

The cell window was permanently closed, glazed with fluted glass, one pane being double. Sir Joshua Jebb's objection to applying the ordinary mode of

ventilation by opening windows, or such means, was that they were "destructive of discipline, in preventing the transmission of sound"—an idea long since rendered obsolete in practice, as will be seen presently.

Writing from Pentonville some years after the opening of that prison, the medical officer says in one of his reports, "The ventilation and warming of the cells have been accomplished satisfactorily by the apparatus constructed for the purpose." By means of an anemometer fixed to the *extraction plate* it was ascertained—

1st. That from 30 to 45 cubic feet of pure fresh air was made to pass into each cell per minute with regularity.

2nd. That the current of ventilation and a temperature of 52° to 60° of heat could be uniformly maintained in the cells during the coldest weather with an expenditure of 2 cwt. to 2½ cwt. of coals for each apparatus daily. Each apparatus warmed and ventilated 66 cells and corresponding corridors.

The amount of air may be increased by lighting the fires in the extraction shafts, or by opening the window ventilator.

In summer the ventilation is effected almost entirely without cost, a fire in the extraction shaft being very seldom required; the difference of atmospheric pressure in the openings of the two shafts, aided by the wind and difference of temperature between the cells and the external air, being considered sufficient to maintain a constant current.

In winter the current of air passing through the cells, though amply sufficient for health, was not so rapid as in summer. The mean of 20 observations did not exceed 30 cubic feet per minute. The velocity of the current may be increased by lighting fires in the extraction shafts.

The advantages derived from window ventilation depend upon its enabling the prisoner to admit directly into his cell the external atmosphere at its natural temperature, freshness, and velocity, so that when increased muscular exertion has been required, or dust liberated from the materials employed in the process of manufacture, he can at once obtain a lower temperature, and free the air he breathes from noxious matters.

From these observations it will be seen that in a cell of 600 cubic feet of air space the atmosphere would, on an average, be changed three times in an hour—all that can be done in this country with internal ventilation without discomfort. Late experiments at Pentonville have shown that the effect of this system of ventilation diminishes progressively in the more distant cells from the tower. The system is in operation at Mountjoy Prison, but in winter the augmentation of bedclothing required would appear to show that the required degree of heat was not maintained. In one of the convict prisons in England, where one-half of the prisoners are kept in separate confinement, except when at exercise, the cubic space (614 cubic feet) and ventilating arrangements are such that the average rates of carbonic acid (according to Wilson), after a series of observations made at different hours of the night, was found to be .720 per 1,000 volumes only—slightly in excess of the maximum impurity of air vitiated by respiration laid down as the limit by Parkes, viz., .6 per 1,000 volumes.

The foul air was extracted on the Jebb system, through flues leading from every cell to a foul air extraction shaft, in which a furnace was kept burning to produce a constant draught. In some experiments which I made in the Military Prison, Dublin, where the apparatus was not in operation, I found the per-centage of carbonic acid in a cell containing 617 cubic feet of air space as high as .091 to .150. The organic matter was perceptible to the senses in the first experiment, and very perceptible in the second; it was also close and stuffy. From a number of experiments made by Dr. De Chaumont, the late Dr. Parkes made the following deduction:—"The prison cells showed in all cases a very high degree of respiratory impurity, and this must be one of the depressing influences of long cell confinement." The mean amount varied from .989 in Pentonville Prison cells on the Jebb system to 1.651 per 1,000 in the Aldershot Military Prison cells, the maximum varying from 1.926 in Pentonville to 3.484 at Aldershot. These scientific facts show conclusively the difficulty of ventilating artificially confined spaces such as prison cells, and the importance of so arranging the construction of the building that natural ventilation may be freely made use of, the necessity of which was so



strongly insisted on by the late Dr. Renny as the result of an extended experience.

Upon the failure of the Jebb system in the Military Prison, Dublin, owing to radical defects in the heating apparatus, we have substituted a natural system of ventilation, which acts certainly better than the Jebb system, *minus* the heating apparatus.

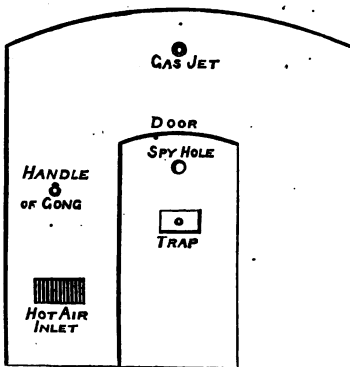
The glass panes have been removed from the five small spaces in the upper part of the window and perforated zinc substituted, the extraction grating from the floor beneath the window and inserted in the flue in the upper corner to the left of the window, and an opening made over the door between the interior of the cell and the corridor. Several experiments show that, as a rule, the air enters the cell through the perforated panes, passes through the cell, and makes its exit through the grating over the door into the corridor, and that the grating to the left of the window acts as an outlet. In one cell where the incoming air is directed upwards by means of a simple wooden flange no ill effects have resulted from leaving the inlets untouched throughout the year. They are partially closed in the other cells during winter, but remain entirely free from 1st May to 1st September or October. In winter stoves are lighted in the corridors, but they seem to have no very great effect upon the temperature of the cells except when the doors into the corridors are open. The minimum temperature reached during last winter with these Gurney's stoves burning was 51° Fahr. in a cell. With regard to the warming and ventilating by means of stoves, Jebb thought that if fresh air was freely admitted into the corridors and warmed by Arnott's stove, the extending shaft, in which there was a smoke flue from some fire generally in use, would ensure economical and effectual ventilation, but that it was advisable to provide an opening from the cell directly into the external air, to be made use of when the weather permitted.

In my opinion the new prison of Kilmainham is the best I have visited. It is in the form of a large pavilion, not unlike a marquee in shape. The floor of the central hall is 48 feet by 141. Beneath this is a basement containing baths (2), cookhouse (3 boilers), bread-room, furnace, store-rooms, refractory cells (4). This basement is lighted with gas and ventilated by means of several circular ornamental iron gratings placed in the stone flooring of the central hall, which is lighted by a large glass dome. A ventilating ridge intervenes between the glass and the other part of the roof lying immediately over the cells, which number 96. The doors of the latter open upon iron trellis work passages encircling the walls, which are coloured buff picked out with black, giving the interior a light and handsome effect. The ascent to the passages encircling the walls is made by a flight of iron steps springing from the centre of the floor. To each tier of cells are attached six lavatories and two of Jennings' water latrines. In the lavatories the prisoners' towels are hung up, and not in the cells as in some prisons. I visited this prison in company with Major Campbell, D.C.R.E., on a cold wretched November day when the temperature of the central hall and interior of the cells was agreeable and pleasant. Both are warmed by heated air. Three tubes conveying hot water from the furnace in the basement lie inside the wall where it joins the cells in a small hollow chamber. The air heated by passing over the pipes ascends to the cells, which it enters to the left of the door and is afterwards collected by the foul air shafts which empty their contents into the chimney of the cookhouse on the one side and that of the heating furnace on the other. 25 to 30 tons of coal are expended yearly for this purpose, according to the severity of the season. Each cell on the ground floor is 7 feet wide and 13 feet long by 11 feet high. The upper cells are somewhat smaller being 13 feet long by 8 feet 6 inches high and 6 feet broad. The long diameter of the window, which is 3 feet by 20 inches, is from side to side. It opens backwards on a hinge to the extent of 5 or 6 inches, shuts on a catch, and is so high as to be beyond the control of the prisoner, and, while admitting an ample supply of air and light, does not allow of the inmate of the cell looking through it. Morning and evening a warder goes round to open and close each window. They are left open during the daytime.

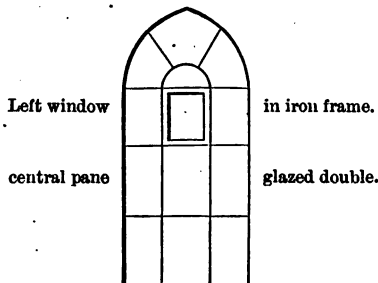
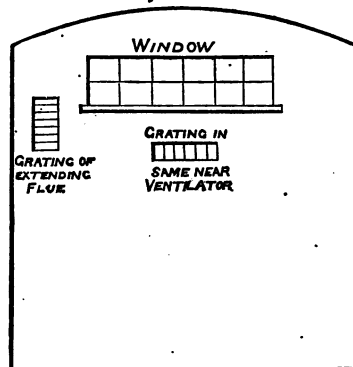
The foul air grating is to the left of the window, and a grating for summer ventilation immediately beneath, with a slide which may be closed during cold weather in winter. This grating communicates with one similar on the out-

side wall. The inlet for heated air is to the left of the cell door a foot and a half from the floor, which is boarded; immediately above this is the handle of the gong by which means the prisoner can communicate with the warders. Each cell contains a cot slung between the side walls and capable of being hooked up during the daytime. The bedding consists of a rug, pair of blankets, two sheets, and a pillow, a delf chamber utensil, only to be used in case of urgent necessity, and a small table and three-legged stool, both of which are chained together and to the wall, so that the prisoner cannot get at the window to commit any damage. A gas jet burns over the doorway, the tube projecting 4 or 5 inches from the wall. There are no means available for carrying away the products of combustion. The refractory cells (4) are in the basement, of which two are boarded for sleeping in. They are altogether closed, with only an opening high up for the exit of foul air and an inlet of perforated iron over the cell doors for warm air. The latter opens into a passage. Two of the cells have stone floors from which the inmates are transferred at night to the boarded ones, where they are allowed a bed, rugs, blankets, &c. A pewter chamber utensil is the only article allowed with the prisoner. These cells are so arranged that the inmate cannot injure himself or disturb his better conducted fellows. The impression made upon a visitor to this establishment is that its general sanitary arrangements are very perfect and the general plan of the building one of the best to ensure ventilation, adequate warming, and cleanliness. In the old prison were occasionally confined soldier delinquents. All offenders against the law from the county of Dublin are sent here, some of them discharged soldier tramps. One of these men, who appeared to have had some experience of prison life, informed the governor, "That it was the finest prison he had been in as yet." Men sentenced to penal servitude are removed to Mountjoy Convict Prison, where, after a period of strict separation, they are employed upon the convict prisons or sent to Spike Island for the public works.

Visitor standing in the centre of a Kilmainham cell and looking towards door sees



Visitor standing in the centre of a Kilmainham cell and looking towards the window sees



On entering the reception room at Kilmainham each prisoner has his clothes removed and fumigated with sulphurous acid. He then has his hair cut, gets a bath and his prison clothing. The punishments are the crank, breaking stones, picking oakum (3 pounds daily for each prisoner). The crime and length of service is written on a card and placed over the cell door. The diet consists of 8 oz. of oatmeal and half a pint of milk for breakfast, taken at 9 a.m.; dinner, 14 oz. of brown bread and one pint of milk at 2 p.m.; supper, 6 oz. of brown bread and half a pint of milk at 5.30 p.m. Meat is only allowed on doctor's order. The contract price of the milk, which was good, was 1s. 3d. per gallon. Water is obtained from a very deep well, and the Vartry pipes. The latter is chiefly used. Prison is generally healthy. The cells are boarded. Asphalt should never be used for this purpose; it is gloomy looking, wears into holes, and into a fine dust, which covers everything, including the person of the prisoners; is breathed into the lungs, and is altogether unsuitable.

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## APPENDIX No. VI.

REPORT ON THE STATE OF VACCINATION OF RECRUITS  
EXAMINED AT THE LIVERPOOL RECRUITING OFFICE.

RETURN of the VACCINATION and SMALLPOX MARKS of 5,000 Recruits  
examined at the Liverpool Recruiting Office from November 21st, 1876  
to May 28th 1878, by SURGEON-MAJOR S. ARCHER.

CLASS.	Description of Marks.	Numbers bearing Marks.	Numbers bearing Marks + S. P. Marks.	Totals.	Ratio per 1,000 in each Class.	Ratio per 1,000 in each Class bearing S. P. Marks.
I.—Best protected, bearing three or more good marks	3 G.	669	5	674	217·8	9·183
	3 G., 1 B.	47	—	47		
	3 G., 2 B.	18	—	18		
	3 G., 3 B.	8	—	8		
	3 G., 4 B.	2	—	2		
	4 G.	209	2	211		
	4 G., 1 B.	5	—	5		
	4 G., 2 B.	9	—	9		
	4 G., 3 B.	1	—	1		
	4 G., 4 B.	2	—	2		
	5 G.	58	2	60		
	5 G., 1 B.	3	—	3		
	5 G., 3 B.	1	—	1		
	6 G.	24	—	24		
	6 G., 5 B.	1	—	1		
	7 G.	9	—	9		
	7 G., 1 B.	1	—	1		
	7 G., 3 B.	1	—	1		
	8 G.	4	1	5		
	8 G., 3 B.	1	—	1		
	9 G.	1	—	1		
	10 G.	2	—	2		
	12 G.	2	—	2		
	13 G.	1	—	1		
Totals Class I.		1,079	10	1,089		
II. — Well protected, bearing two or more good marks	2 G.	1,638	39	1,727	383·4	21·383
	2 G., 1 B.	108	2	110		
	2 G., 2 B.	51	—	51		
	2 G., 3 B.	19	—	19		
	2 G., 4 B.	7	—	7		
	2 G., 5 B.	3	—	3		
	Totals Class II.	1,876	41	1,917		
III.—Moderately protected, bearing one good mark	1 G.	803	34	837	219·4	41·021
	1 G., 1 B.	188	6	194		
	1 G., 2 B.	47	4	51		
	1 G., 3 B.	7	1	8		
	1 G., 4 B.	6	—	6		
	1 G., 7 B.	1	—	1		
	Totals Class III.	1,052	45	1,097		
IV.—Badly protected, bearing no good marks	1 B.	121	13	134	68·0	91·176
	2 B.	124	14	138		
	3 B.	42	3	45		
	4 B.	14	1	15		
	5 B.	4	—	4		
	6 B.	2	—	2		
	7 B.	1	—	1		
	10 B.	1	—	1		
Totals Class IV.		309	31	340		
V.—Unprotected	No marks	367	190	557	111·4	341·113
Totals Class V.		367	190	557	—	—
Grand Totals		4,683	317	5,000	1,000	—

NOTE.—G.=Good. B.=Bad or Imperfect.

## SUMMARY.

CLASS.	Total numbers examined in each Class.	Numbers bearing S. P. Marks in each Class.	Ratio per 1,000 in each Class.	Ratio per 1,000 bearing S. P. Marks in each Class.	Ratio per 1,000 bearing S. P. Marks in total examined.
I.	1,089	10	217.8	9.183	63.4
II.	1,917	41	383.4	21.388	
III.	1,997	45	219.4	41.021	
IV.	340	31	68.0	91.176	
V.	557	190	111.4	341.113	
Total	5,000	317	1000.	—	

OBSERVATIONS ON a TABLE showing the VACCINATION and SMALLPOX MARKS of 5,000 recruits examined at the Liverpool Recruiting Depot between the 21st November 1876 and 28th May 1878.

On assuming charge of the Liverpool recruiting district in October 1876, I was much struck with the large number of men who appeared before me who were either imperfectly vaccinated or who had not been vaccinated at all, and it occurred to me that it would be interesting to keep a record of the marks of the recruits so as to obtain data for the construction of a table which would give some idea of the state of vaccination of the adult male population, and also of the relative liability to contract smallpox as shown by the number of marks in those who had suffered from the disease.

On the 21st November 1876 I commenced noting the marks of each man who presented himself, and by the 28th May 1878 having obtained 5,000 data, a convenient number and one sufficiently large to allow of some reliable deductions, I commenced to tabulate the result.

The accompanying return shows the state of vaccination of, with a few accidental omissions, all the recruits whom I have examined for the regular army or the militia between the dates named, specifying those who had suffered from smallpox.

The recruits were from all parts of Great Britain and Ireland, and a small number from the colonies and foreign countries. About 64 per cent. were English, 29 per cent. Irish, and 5 per cent. Scotch.

The vast majority were between 18 and 25 years of age, a very small number being under or above that.

The same individuals frequently appeared before me twice, as in the case of transfers from the local militia, but for the purposes of this table the state of vaccination was only recorded once.

The marks are returned as good, or as bad, or imperfect, those only being included in the latter category which were very small or very indistinct, such in fact as could not with any certainty have been regarded as vaccination marks at all were it not for their situation.

I have divided the individuals into classes according to the number of marks borne, and in Class I. have included all those who had three or more good marks.

All in this class may be considered as very well protected, and those in it bearing smallpox marks were very few; less than one per cent.

I did not subdivide the class on this account and because a ratio showing the proportion of S. P. in those bearing three, four, five, six, &c. marks would have been, in consequence, misleading.

For instance, in 209 men with four good marks there were two who had had smallpox, whilst in 58 with five good marks there were also two, and in four with eight good marks there was one.

In Class II. are included those bearing two good marks, and the number in this class is much larger than in any other as might have been anticipated.

In Class III. are shown those possessing one good mark. In this class are a considerable number bearing one large mark resulting apparently from the confluence of a number of vesicles produced by applying the lymph to free scarification. Had these been excluded the ratio of small-pox occurring in this class would probably have been larger.

There are also a large number, 194, bearing one good and one bad mark, and 51 bearing one good and two bad marks, in which case it is evident that from some defect in the operation or subsequent accident, one or two of the vesicles, as the case may be, were not matured.

Class IV. includes 340 men who bore marks of vaccination, but all of which were imperfect, either very small or very faint.

In Class V., those not bearing any marks, are included a considerable number who stated that they had been vaccinated but on whom no marks could be discovered.

Similarly, men have sometimes stated that they had had smallpox who presented no indications of having suffered from the disease.

As might have been anticipated from the investigations of Marson, published in the *Medico Chirurgical Transactions* for 1853, which proved there was a decreasing mortality in cases of smallpox in proportion to the number of vaccination marks, so the liability to contract the disease diminishes in a ratio corresponding pretty accurately with the number of vaccine vesicles which have been produced, whilst the proportion of cases occurring in the unvaccinated, or in those not bearing marks, is extremely large. If my observations are exact upwards of one-third of the unvaccinated contract smallpox before middle age.

It will be noticed that the ratio of small-pox occurring in Class III. almost doubles that in Class II., whilst the ratio in Class II. more than doubles that in Class I. This may very probably be due to Class I. including a considerable number on whom re-vaccination has been performed, and who may therefore be considered as proof against the smallpox contagion.

To show the actual ratio of the occurrence of smallpox in each class the ratio of mortality should of course be added, and Marson's table would supply this. With reference to re-vaccination I found it impossible to obtain reliable information.

In France regulations are, I believe, enforced by which the re-vaccination of army recruits is performed arm to arm from primarily vaccinated children.

Were such a system possible in this country, I have no doubt that the present low ratio of smallpox in the service would be still further reduced, if the disease did not disappear altogether from the statistics of the Army Medical Department.

The table shows pretty conclusively :—1stly. That for efficient protection three vesicles at least are necessary ; 2ndly. That the vaccine virus has not diminished in power by transmission through large numbers of individuals, and consequently that resort to animal vaccination is not necessary. 3rdly. The great risk that is run of contracting smallpox by unvaccinated persons. 4thly, that a very large proportion of the present adult population of the kingdom is imperfectly or not at all protected.

There can be little doubt that when the rising generation, which in consequence of the Act of 1867 is so much better protected, individually and numerically, becomes adult, smallpox will become comparatively a rare disease and an epidemic almost impossible.

## APPENDIX No. VII.

ABSTRACT OF REPORT OF A CASE OF CROUP IN WHICH  
TRACHEOTOMY WAS SUCCESSFULLY PERFORMED.

By Surgeon-Major S. ARCHER.

E. A. T., aged 18 months, the child of a non-commissioned officer, was seized with symptoms of croup on the afternoon of 21st February 1878, and first seen by me on the following morning. She was a rather delicate child, and had lately been under treatment for diarrhoea, consequent on the irritation of teething.

Up to the 25th she appeared to be progressing favourably, but on that day her breathing became more difficult and hurried, the tongue coated with a thick creamy fur, and during the night she had several severe paroxysms of cough and dyspnoea.

On the evening of the 26th, as the symptoms were not in any respect relieved, it was evident that tracheotomy alone offered a chance of recovery, and, with the concurrence of Drs. Rawdon and Ireland, who kindly assisted me, I determined to operate at once.

Chloroform was administered, and immediately relieved all spasm, and allowed the operation to be performed with deliberation and care. The external wound was made large so as to allow as good a view as possible of the parts, but the shortness of the neck, the child being so young, and the depth of the wound, rendered the opening of the trachea and insertion of the tube somewhat difficult. There was no trouble from hæmorrhage. On dividing the rings of the trachea some long shreds of false membrane protruded at the opening and were removed.

Durham's canula, with moveable collar and jointed guide, were used, the latter much facilitating its introduction.

The inner tube was not inserted, as I judged it advisable to let as much air into the lungs of the child as possible. The wound was not brought together by sutures, as I anticipated having to remove the tube from time to time for the purpose of cleaning it.

Feb. 27. The relief to the breathing was immediate, but in the course of a few hours considerable fever set in, the face became flushed, respiration hurried, though not difficult, and pulse very frequent. She was very restless, did not sleep the whole night, and from time to time coughed up through the tube a little viscid mucous. She drank milk with avidity. About three hours after the operation I found that the canula was becoming clogged with secretion, and removed and cleansed it. It was re-inserted without difficulty. I found it necessary to repeat this procedure every two or three hours throughout the night and this day. During the day the febrile symptoms continued, but she dozed for an hour or two and was less restless.

Feb. 28. Passed a better night, and this morning the fever has commenced to abate and the tongue to clean at the tip. Ordered small quantities of port wine and water to be given alternately with milk every hour. Continued to remove the canula every few hours to clean it, and found that each time I inserted it a fit of coughing was induced, which helped to rid the trachea of accumulated mucous and sometimes of shreds of false membrane. Twice during the day I was obliged to hurriedly remove it on account of its becoming suddenly obstructed.

In the afternoon whilst engaged in washing it the child was seized with an urgent attack of dyspnoea threatening instant suffocation. The lips became purple, face pallid, and she struggled for breath. I at once inserted the canula and sucked through it some thick mucous which had accumulated in the trachea, and she shortly afterwards coughed up some more. She again breathed tolerably freely but was in such an exhausted state, almost pulseless, that I hardly thought she could survive. I ordered small quantities of port wine to be given at frequent intervals, and on again visiting her a couple of hours later found that she had rallied considerably.

March 1. She is much better. Is free from fever, tongue is cleaner, and secretion less viscid and more readily coughed up. Brought the edges of the wound together with adhesive plaister. It is not necessary to remove the tube so frequently.

March 2. Is going on well, but every time she drinks small quantities of the fluid trickle down into the trachea and cause a good deal of irritation. Ordered her thick arrowroot and beef tea thickened with arrowroot and milk to be given only in very small quantities at a time. I was informed by her father that to-day she coughed up a quantity of thick white phlegm through the mouth.

March 3. The difficulty in swallowing increasing, ordered her enemata of strong beef tea with port wine every fourth hour. Wound not looking so healthy, and finding it unusually easy to introduce the canula I carefully examined it and discovered that the tracheal opening was considerably enlarged by ulceration. She is able to-day to breathe through the mouth, though with some little difficulty.

March 4. Removed the canula this morning and brought the edges of the wound together with plaister. Enemata continues.

March 5. Wound healthy and contracting. Has less difficulty in swallowing.

March 6. Enemata not retained so well. Directed they should be given every sixth instead of every fourth hour.

March 8. Wound in trachea still open but slowly healing. Swallows better. Discontinued the enemata.

March 11. Wound in trachea nearly closed. Breathes freely through the mouth and takes food well.

March 17. Tracheal opening closed and external wound nearly healed.

March 20. External wound healed. She is quite well and goes into the country in a few days for change of air.

*Remarks.*—Recoveries after tracheotomy for croup in children under three years of age are so rare that a successful case deserves to be recorded. Trousseau (Clinical Lectures, 1869) mentions only three cases of children under 18 months in which the result had been favourable, and I have only been able to find two or three published in the medical journals since that date. He mentions that Millard and Peter record 26 cases between the ages of 2 and 3, and in all the result was a failure.

I attribute the successful issue in the above case, in part, to the great care which was taken to keep the canula free and the supply of air to the lungs abundant. This can only be done, where the tube is single, by its removal from time to time. No medicine was administered after the operation, excepting one or two doses of a mild aperient.

The case illustrates the necessity for constant watchfulness for the first few days after the operation.

A child of the same age on whom I operated last year died asphyxiated on the second day. There was in that case some extension of the disease down the trachea, but I am not at all certain that in my absence the tube had not got plugged and that that was the true cause of death.



## APPENDIX No. VIII.

**ROUGH NOTES ON THE SUBJECT OF VESICAL CALCULI,  
WITH A BRIEF RECORD OF CASES, TO ACCOMPANY A  
SMALL COLLECTION FORWARDED TO THE MUSEUM OF  
THE ROYAL VICTORIA HOSPITAL, NETLEY.**

**Localities in  
Upper India.**

Vesical calculi are common amongst the natives of Upper India in certain parts of the North-West Provinces and Oudh, and seem comparatively rare in adjacent districts further from the mountains. The principal region where they most prevail is that of the belt of Terai land, reclaimed from the dense jungle at the foot of the Himalayas, and extending from Shahjehanpore in the north, through Oudh, to the large district of Goruckpore, at the Government dispensary of which city the cases applying for treatment are so numerous that an average of more than an hundred are operated on every year, mostly by the sub-assistant surgeon, a native gentleman, a graduate of the Calcutta University, and a most skilful operator.

**Treatment  
before opera-  
tion not usual.**

From observation and on inquiry into the practice of many experienced surgeons of the Indian service, it seems to be the rule and not the exception to operate at once, if possible, for the following reasons: The usual preliminary detention for treatment is distasteful to these unfortunate natives, generally cultivators or workmen and their children brought from a distance, and in the writer's practice several cases have absconded during the night after consenting to the operation, from vague fears and not understanding the necessity for delay. Generally, therefore, the custom is, after well weighing the symptoms, if the presence of a stone is suspected, to obtain the consent of patients or friends to place under chloroform, and, if careful sounding corroborates the suspicion, to proceed to operate on the spot.

The disadvantage of not being able to wait and endeavour to improve the general health, &c. is counterbalanced by the well-known ease with which Asiatics recover from formidable operations, and in these cases of stone, many in a deplorable state of emaciation from pain and want of rest, make excellent recoveries.

**Difficulties.**

In children the tendency to prolapsus ani is sometimes a source of trouble and delay during the operation, and the risk of getting into the ischio-rectal space by mistake must also be borne in mind. This untoward accident seemed once to have happened to the writer with a child of 4 years old, for on reaching and exploring what was apparently the bladder, no stone could be found; happily the sub-assistant surgeon above mentioned was present, and he with a very long fore-finger eventually found and extracted from above the pubes, in his nail, a tiny calculus the size of a small pea.

**Drainage tube.**

With reference to the conduct of the operation, the only departure from the rules laid down is that the drainage tube is seldom used, and from what the undersigned could gather, opinion seems to agree that risk of infiltration is not increased by its absence, though of course circumstances sometimes render its employment desirable, as in hæmorrhage, when the petticoated tube would be indeed necessary.

**Preference for  
lithotomy in  
India.**

It is hardly likely that lithotripsy will ever supersede lithotomy to any extent, as has been propounded by high authority (in India at least), and this opinion is hazarded with all diffidence, but it is founded upon the fact before stated, viz., the impatience and timidity of the natives, the result of their ignorance and superstition, and there is less reason to desire such a change, for although many cases doubtless would be fit ones, the operation of lithotomy is so generally successful, that, except under exceptional circumstances, there could be no object in resorting to lithotripsy, and after extended inquiry it may be stated that the practice is not in favour with surgeons in India.

No. 1. Lad aged 15, Weaver caste. Emaciated by pain and want of rest; Cases. often obliged to micturate on hands and knees, symptoms since childhood, increasing in urgency during last year. Operation, 6th February 1861. Mulberry calculus, irregularly oval covered with projections or spines, giving the appearance of a fir-cone; the forceps slipped two or three times before obtaining a firm hold, grinding off one or two projections. Weight, 1 oz. 30 gr. No tube. Recovered in 21 days.

No. 2. Boy aged 5. Well nourished, symptoms not very urgent. Operation, 9th February 1861, interrupted by troublesome prolapsus ani. Alternating stone, oval, flat sides. Weight, 2 dr. 54 gr. No tube. Recovered in 16 days.

No. 3. Lad aged 16, in weak state. Symptoms urgent. Operation, 9th August 1861. No tube. Urine by urethra sixth day. Round stone, symmetrical. Uric acid. Weight, 6 dr. 20 gr. Recovered in 21 days.

No. 4. Lad aged 11, Kahar caste, in weak health and rather emaciated. Operation, 16th August 1861. Uric acid and ox. lime; round stone flattened at sides. Weight, 5 dr. 28 gr. No tube. Recovered in 22 days.

No. 5. Lad aged 11 or 12. Symptoms not very severe; had suffered for two or three years. Operation, 5th November 1861. Oblong brown stone like a smooth walnut. Mulberry, apparently triple phosph. beneath the surface. No tube. Recovered in 21 days.

No. 6. Man aged 45, Mullah caste (boatman). Symptoms for years past, latterly increasing in urgency; urine loaded with deposit. Operation, 7th December 1861. Calculus weighing 7 dr. 7 gr. Alternating friable phosphatic deposit externally, giving a rough appearance at larger end, with minute porous structure like dead bone; the hard substratum at either side, the bulk of the stone, apparently oxalate of lime, is exposed. Deep perinæum. Wound and bladder gently syringed. Tube inserted, removed next day. Recovered in 26 days.

No. 7. An old man aged 68, Aheer caste (shepherd). Operation, 29th September 1863, at Azimghur. Admitted in much pain and distress, bladder very irritable, figure small and attenuated, the skin hanging in loose folds and wrinkles, especially over chest and abdomen, and not an ounce of fat on the body; this appearance being very common in aged natives whose lives have been one long course of privation and suffering. He was not a promising subject for operation, but most anxious for relief. On passing a sound, a gristly feeling was imparted to the touch in the prostatic portion, and on entering the bladder the stone was felt on the left side, the sound grating on passing it; a large one was diagnosed, but no idea could be formed of its great size, or the operation might not have been attempted. The bladder was quickly reached and an attempt made to seize the stone at its narrowest diameter, the forceps opened to their widest extent repeatedly grasped and brought it to the pelvic outlet and as often slipped; the finger and scoop were then tried, but no manipulation could overcome the hopeless jam, nor would any modification of the lateral operation have sufficed, and further violence and delay were not warranted. At this trying juncture, the patient's pulse and breathing being good, it was determined to extract by the suprapubic operation; the abdominal walls being very thin, an incision about 3 inches in length was carried from the pubes upwards in the mesial line, the linea alba exposed and divided, a catheter being made to raise up the fundus of the bladder, the peritoneum was pushed back and not wounded, the catheter cut down upon and the aperture enlarged sufficiently to allow of extraction; the walls of the bladder were much thickened and contracted; the whole time under chloroform being about three-quarters of an hour. On regaining consciousness a diffusible stimulant and opiate draught was given. No tube was inserted. By evening he took a little milk and spoke cheerfully, pulse fair, urine dribbling through the perinæal wound; there was no hæmorrhage to speak of, and he continued to progress favourably until the third day, when a low form of peritonitis set in, probably from infiltration, and he sank exhausted. Weight of calculus, 6 oz. 4 dr. 35 gr. Uric acid. Largest circumference,  $7\frac{1}{2}$  inches; shortest, 7 inches.

No. 8. Child aged 5. Operation, 11th November 1861. Elongated prepuce, symptoms not urgent, small oval stone. Weight, 1 dr. 28 gr. Composition uncertain. Prolapsus caused slight delay. No tube. Recovered in 14 days.

No. 9. Boy aged 15, Chumar caste. Symptoms for last four years, but not urgent; in fair health and not emaciated. Operation, 14th December 1861, was completed in a very few minutes, the stone in its long axis falling within the blades of the forceps with the first gush of urine and removed without stretching or bruising of the parts, the smaller stone afterwards brought away with finger and scoop; the urine passed by the urethra next day and continued to do so, the perinæal wound healing in eight days. To account for this fact it has been suggested that the stone was in the prostate, and so perhaps it may partially have been, but the bulk of it lay in the bladder, for it was after encountering the elastic ring at the neck and introducing the forceps that the stone was seized, so the narrow end may have been protruding and pushed in front of the finger. Two uric acid calculi. Weight, 3 dr. 20 gr., the larger, smooth,  $2\frac{1}{2}$  inches long,  $2\frac{1}{2}$  round centre, a narrow neck at one end giving somewhat a resemblance to an Indian club,  $1\frac{1}{2}$  inch round neck; a small detached half-moon shaped stone at larger end with cup-shaped facet fitting the opposing surface.

No. 10. Man aged 40, Aheer caste. Symptoms urgent. Operation, 24th August 1861. Nothing untoward occurred, and he made a good recovery in 24 days. Two fawn-coloured stones, the larger kidney-shaped, smaller, size of a broad bean. Aggregate weight 3 dr. 17 gr. Composition uncertain.

No. 11. Man aged 38, Sheikh (Musalman), a weak anæmic subject. Symptoms urgent; bladder very irritable, urine loaded with deposit. Operation 26th August 1861. Deep perinæum, wound and bladder syringed. Calculus pyriform in shape; weight, 7 dr. 46 gr. Body probably oxalate of lime, outer shell of phosphatic deposit. Recovered in 30 days.

No. 12. Lad, aged 18 to 20, applied for relief on account of retention, although he had suffered for two or three years with pain, sense of weight, and irritation in the perinæum. The stone was partly in the prostate, and seemed to be projecting into the membranous portion and could be felt externally. It was removed by the ordinary operation, and a catheter was passed and retained for a few days, and a good recovery made. The shape of this calculus is somewhat triangular, the apex surrounded by a brown ring, apparently oxalate, and forming the body of the calculus, which is coated by a chalky-white deposit, phosphatic (and perhaps carbonate of lime?). The larger end is perforated by two irregular slits or apertures, which may have given passage to the urine.

No. 13. Lad aged 11. Operation 11th November 1861. Nothing unusual occurred, and he recovered in 21 days. A flat triangular heart-shaped stone; weight, 5 dr. 40 gr.; composition uncertain.

No. 14. Man aged 40, Chuttree caste, of spare habit and much reduced by suffering. Symptoms urgent. Operation 7th December 1861. Some slight bleeding stopped by pressure. Wound and bladder syringed to remove fragments; tube surrounded by plug introduced, removed second day. Rough phosphatic stone, outer shell broken by forceps. Recovery in 30 days.

No. 15. Lad aged 18, Bunniah caste. Symptoms for several years. Operation 12th December 1861. Calculus rather difficult to extract until manipulation brought it favourably to the forceps. No tube. Recovered in 22 days. Oblong rectangular stone, alternating (?), 1 oz. 5 dr. 3 gr. in weight,  $2\frac{1}{2}$  inches long,  $1\frac{1}{2}$  inch broad.

No. 16. Young man aged 26, Lohar caste (blacksmith). Symptoms urgent, urine loaded. Operation 20th December 1861. Soft phosphatic stone; broke in pieces by forceps; bladder and wound syringed and all fragments removed. No tube. Recovered in 25 days.

No. 17. Child aged 4. Operation 28th February 1862. Troublesome prolapsus reduced and kept back by a sponge till conclusion of operation. Recovered in 14 days. Uric acid and triple phosphate; weight, 1 dr. 30 gr.

No. 18. Young man, Kahar caste, age about 25. Phosphatic calculus, broke into many fragments; bladder and wound washed free from debris. Recovery in 24 days.

No. 19. Child aged 5, Brahmin caste. Operation 6th March 1862. Small hard stone; nucleus and part of shell lost, the latter like a cherry stone. Recovered in 12 days.

No. 20. Child aged 6, Chumar caste. Operation 14th March 1862. No trouble, and recovered in 18 days. Small symmetrical calculus, uric acid, size of pigeon's egg; weight, 36 grains.

No. 21. Man aged 50, Weaver caste. Symptoms long duration, emaciated by suffering. Operation, 19th March 1862. Triangular, flat, rough, oxalate of lime calculus. No trouble during operation; rather feeble afterwards, requiring stimulants. Good recovery in 28 days.

No. 22. Lad aged 18, Aheer caste. Symptoms urgent, had suffered for some time. Operation, March 1862. Rough triangular stone, phosphatic shell, probably alternating; weight, 7 dr. Recovered in 21 days.

No. 23. Man aged 56, Chumar caste. Symptoms, for many years much reduced by suffering. Operation, 13th September 1861. Deep perinæum, bladder difficult to reach; no trouble in extraction; secondary hæmorrhage occurred on 18th; tube and plug employed. The patient sank the next day, 19th. Oxalate lime calculus and triple phosphate; weight, 1 oz. 17 gr.

It is a matter of regret that five other calculi should have been lost by some mischance during various moves and changes of quarters abroad, and amongst them one death occurred by peritonitis; the mortality, therefore, was 3 in 28. Rate of mortality.

With a few exceptions the composition of the majority of these specimens is obvious; only a rough attempt at designation has been made, and they could, if necessary, be described with more accuracy after sawing asunder and analysis. Composition.

The natives themselves ascribe the disease to the drinking water, which, frequently in and near these villages, is found to contain a large proportion of salts, and the adjacent tracts covered with "Oosur," or efflorescent salts; the coincidence of Goitre also in districts noted for stone in the bladder is well known; but as rheumatism with anæmia and debility are universal, and in fact the whole train of ailments traceable to the common factor of imperfect assimilation, the causes need not be far to seek when one remembers the peculiar habits and the monotony and poor quality of the food consumed by the large mass of natives in India. Supposed causes.

In arranging these brief notes, the writer finds a nominal roll of cases, 112 in number, of operations at the Goruckpore Dispensary for the 15 months preceding his arrival there, compiled by the sub-assistant surgeon, and although imperfect and giving no details as to the nature of the calculi, some information may be gleaned from it. The roll is taken up with particulars of caste, occupation, age, &c., but it would have been instructive to have known the composition of these calculi, as I believe that the oxalic and also the phosphatic diatheses occur more frequently in young patients than is generally assumed to be the case. Analysis of roll of cases at Goruckpore during 15 months.

Age.	Cases.	Recovered.	Deaths.	Average Number of Days under Treatment.
To 5, inclusive	15	14	1	13.66
Between 6 and 10, inclusive	42	41	1	14
" 11 and 20	26	25	1	29.7
" 21 and 30	3	3	0	21.33
" 31 and 40	18	13	5	18.75
" 41 and 50	6	5	1	19.50
" 51 and 60	1	0	1	12
" 61 and 70	1	1	—	21
	112	102	10	—

Actual Age.		Cause of Death.
10 deaths	3 - -	Convulsions.
	10 - -	Abscess of kidney three months afterwards.
	11 - -	Peritonitis and diarrhoea.
	35 (2 cases) {	(1.) Inflammation of bladder.
		(2.) Hæmorrhage 5 hours after operation.
	38 - -	Dysentery and fever.
	40 (2 cases) {	(1.) Hæmorrhage and exhaustion.
		(2.) Secondary hæmorrhage and exhaustion.
	50 - -	Not known; probably exhaustion.
	60 - -	Dysentery.

These ages must only be taken as approximate, the subject being one upon which native computation is usually vague, and rarely to be relied upon.

Devonport, 1st January 1878.

HENRY KELSALL,  
Surgeon-Major, A.M.D.

## APPENDIX No. IX.

CASE OF SWORD-BAYONET WOUND OF THE ABDOMEN WITH  
PROTRUSION OF THE OMENTUM; PUNCTURED WOUND OF  
THE ABDOMEN PENETRATING THE STOMACH; WOUND  
OF THE CHEST WITH PROTRUSION AND STRANGULATION  
OF A PORTION OF THE LUNG, BESIDES OTHER INJURIES.

By Surgeon-Major F. A. TURTON, M.D., Army Medical Department. In  
Medical Charge of 2/60 Rifles.

The patient respecting whom these notes have been compiled passed through Netley Hospital during the invaliding season of 1878. With the exception of having pain in the seat of the chest and abdominal wounds on making any exertion, he appeared little the worse for his extensive injuries.

Being much interested in the case, especially that portion respecting the wound in the stomach, I solicited further particulars, and was kindly favoured with the following.

(Signed) J. H. PORTER, *Surgeon-Major*.

Royal Victoria Hospital, 15th July, 1878.

No. 1,779, Private Charles Hagan, 2/60 Rifles; 28 years of age; and of 9 years' service. This man is a well proportioned and muscular Irishman, and was evidently in the enjoyment of good health up to the moment that he received the bodily injuries, which will hereafter be described, after an account has been given of the way in which he received them. It appears that at a little before 10 o'clock on the night of the 14th February, and while lying on his cot in the barrack room in a helplessly drunken state, he was attacked by a comrade (who was also drunk) with a drawn sword-bayonet, and received therefrom no fewer than fifteen (15) wounds, three of which were so severe as to place his life in jeopardy, while the others were less serious in their character. He had:—

One sword cut over right patella, about 2 inches in length.

One punctured wound in the abdomen through which a small knuckle of omentum protruded, and of course into which a probe easily entered passing into the abdomen.

One punctured wound, penetrating the stomach, into which (stomach) the probe easily passed. The stomach was emptied of its contents by vomiting, and blood was mixed with the ejected matter.

One wound on the left side of chest between the 6th and 7th ribs, through which a portion of the lung protruded and became strangulated.

One wound on the right side of chest across the mammilla.

One wound half an inch below the mammilla.

One punctured wound over the sternum (superficial).

One incised wound over the left wrist joint.

One incised wound on the posterior surface of the thumb of the left hand.

One punctured wound on the inner portion of the right hand.

One incised wound, 2 inches in length over the scalp.

One severe penetrating wound into the left inferior maxilla causing the displacement of one of the molars and partial fracture of a portion of this bone; together with other trifling injuries to the fingers.

The patient was seen, within a short time after he was in the Hospital, by the Medical Officer on duty. This officer vainly attempted to return the portion of protruded lung.

The patient, when first seen by me, was, as I have said, in a helplessly drunken state, bawling and making night hideous with his cries. He was lying partly on his left side, with blood oozing from the different wounds that he had received and in a weak state consequent on the shock and loss of blood. On

examining him I found the wounds as I have already described them, and saw that I had to deal with the case of a man whose life was, as it were, hanging on (the chances of) a thread. I allowed the patient to remain in the bed in which he was placed on admission to hospital, and half a grain of Morphia with five grains of sugar were placed on his tongue and washed down the throat by means of water which was allowed to enter his mouth in drops. At 12.30 a.m., on the 15th February, he was quieter and the oozing of blood from the cut surfaces (over which cold water dressing had been applied) had ceased. He was now ordered to have Morphiae, Hydrochloratis gr. ½, Sacchari. Albi gr. v. on his tongue every three-quarters of an hour until a sleep was induced. After taking six doses of this medicine he became quiet and went into a drowsy state in which he continued for some hours.

On making my morning visit (15th February) 8.30 a.m. Pte. Hagan was quiet, and appeared comfortable, and had had some sleep between 4.15 a.m., and the time of this visit. He was now placed in a separate ward with two orderlies to attend him. The pulse was high, full, and throbbing. Tongue furred, skin dry. Was ordered enemata of warm water and castor oil every third hour until his bowels were freely relieved; three injections were administered before he experienced a great and satisfactory relief. At this visit he was also ordered a saline draught with 10 minims of tincture of opium every third hour. Cold water to be applied to the wounds. The lung (protruded portion) was very red; and a stethoscopic examination of the left chest revealed localised crepitus to a very limited extent.

2 p.m., 15th February was again visited, when his skin was found hot and dry and pulse was 120. The temperature, I forgot to say, had been taken at my morning examination and was found to stand at F. 99.8. Visited the man at 6.30 p.m., and was informed that his temperature at 4 o'clock had been as high as 101.8. He was at this time (6.30) complaining of feeling feverish, his pulse was high and full; he was quiet and made no complaints about the wounds. The orderlies and hospital attendants had strict injunctions not to speak to the patient, nor on any account to allow him to speak to them; every thing required by him, therefore, was made known to his attendants by his signs.

His medicine was ordered to be continued and the cold dressings were steadily kept over the wounds.

Feb. 16. Temperature last night at 9.30 o'clock was 101.4. He was then quiet and drowsy.

This morning the patient quiet, complains of severe pain in the jaw, where he had been wounded. Pulse quick and compressible. Skin hot and dry. Continue medicine and local applications. Temperature 99.4.

The patient was visited at 1 o'clock and again at 6.30 p.m.,. He was doing as well as could be expected. The lung was darker and shrivelling up somewhat. The pulse at 1 o'clock was 108, and the temperature at 4 p.m., was 100.8. At the evening visit a poultice of poppy heads was ordered to be applied to the jaw, which was very painful.

Feb. 17. Is better this morning. Surgeon-Majors Quinlan and O'Sullivan and Surgeon H. Charlesworth saw the case. Carbolic Acid 1 in 120 to be applied to wounds. Curious to relate the omentum was red and granulating, and daily getting smaller in size. Temperature 99.4.

Feb. 18. Continuing to progress favourably. Pulse quiet, skin cooler than usual, tongue clean, pain less severe in the jaw. Continue medicine. To have the bowels relieved by enemata daily. Temperature in the morning 98.4. Vesper. Doing well. Temperature 99.

Feb. 20. Progressing most satisfactorily. The poppy head fomentations are being continued to the jaw. The bowels are daily relieved by injections and the Carbolic Acid is being continued, but the strength of it has been reduced to 1 part in 150 parts of water.

Temperature morning, 98.8.

" evening, 99.

During the evening visit he was ordered

Liq. Morphia 3 iss.

Aqua. Camph. 3i.

To be taken at night.

Feb. 21. Continuing to progress favourably. Diaphoretic mixture to be administered as usual, and the lotion and enemata to be continued. In the evening a sleeping draught as prescribed last night was again ordered to be given. This treatment was continued steadily up to the 2nd March, when I found it advisable to increase the strength of the Carbolic Acid lotion, owing to the pale and inactive appearance of the wounds, from 1 in 150, to 1 in 100 parts of water. The diaphoretic mixture and enemata are being daily given.

Mar. 5. The protruded portion of lung is quite black and will shortly fall off. The omentum is fast granulating and daily getting smaller. The health of Private Hagan is very good.

Mar. 9. The piece of lung came off yesterday (*i.e.*, 22 days after the injury was received), and there is left a clean granulating surface.\* The omentum getting smaller. Continue everything.

Mar. 12. Complains of a sharp cutting pain in shoulder. No pulmonary disturbance detected by the stethoscope. Continue everything. Skin is hot and dry and the temperature stands at 100·2.

Mar. 13. Is somewhat better this morning; had 8 grs. of Dover's powder last night. Can take a *full inspiration*. Tongue clean, bowels regular.

Mar. 14. Is better. Continue medicine and local applications.

Mar. 18. Doing remarkably well; wound in the abdomen quite healed.

Mar. 22. Doing well.

Mar. 27. Wounds over the patella and scalp are healing kindly, all others are well.

Mar. 30. Discharged from the hospital to be sent to the Convalescent Depot at Landour.

*Remarks.*—This has been throughout a most interesting case, when it is borne in mind that Private Hagan has always had the character in his corps of being a drunkard, and that his chest, stomach, and abdomen were each as severely injured as to place his life in the greatest danger. The patient was kept, as I have endeavoured to show, in as quiet a state as possible, and nothing of any kind was allowed to enter his ward that could in any way tend to excite him.

The practice pursued of allowing the protruded lung to remain until it sloughed off is, I consider, right.

No food or fluids passed through the wound in the stomach, nor were there any prominent symptoms of this injury. The greatest care was taken as to the dieting of this man, and milk and extract of meat in very small quantities were frequently given, and but little in the way of other fluids was allowed him. The stomach was never distended, nor was Private Hagan permitted to move off his back, *until the wound in the epigastrium had closed*.

The portion of the lung that protruded was 2 inches in length and 1½ in breadth. It was treated locally, and as already described. There was no hæmoptysis, because it appears that the portion of the organ that protruded must have followed the instrument which caused the wound and that the entire portion of the injured lung had evidently got outside of the wall of the chest, where it became strangulated. A small knuckle of omentum protruded from the abdominal cavity about the size of a large broad bean. There was no symptom of peritonitis nor gastritis in this case; and as the patient was doing well from the day following that on which he came to hospital, I am happy to say that by leaving "well alone" he made a good recovery.

This man has since been discharged from the Rifles as an invalid, and was sent to Netley with the invalids of the season in the early part of this year.

MEERUT,

11th June 1878.

\* Detached piece of lung is now in the Pathological Museum, Royal Victoria Hospital, Netley.



## APPENDIX No. X.

## CASE OF ANEURISM OF RIGHT FEMORAL ARTERY TREATED BY DIGITAL PRESSURE. "RECOVERY."

By M. D. O'CONNEL, M.D., Surgeon,  
In Medical Charge F. Batt. 4th Brigade, R.A.

Regi- mental No.	Rank and Name.	Age.	Service.	Service in India.	Married or Single.	Disease.	Remarks.
2,600	Trumpeter J. B.	46	28	28	Married	Aneurism of right femoral artery.	—

*History.*—Present medical history only dates from 1860. His former medical history sheet was destroyed or lost during the year of the mutiny.

He states that in the mutiny he was shot through the right thigh, the bullet entering posteriorly four inches below the great trochanter, and lodging under the skin on the front of thigh, from which situation it was cut out. He also suffered severely from an explosion of gunpowder. Cicatrices confirm both statements.

There is no entry of syphilis in his medical history sheet, but he states that he had a syphilitic sore in the year 1854. It was not followed by enlarged glands, sore throat, or cutaneous eruption. The following are the only entries in medical history sheet :—

Year.	Disease.	Duration.
1865 - -	Dislocation of humerus - -	15 days.
1867 - -	Ague - -	4 "
1875 - -	Ague - -	8 "
1876 - -	Contusion - -	10 "

On the 11th February 1878 the battery marched out with the other troops in garrison for field firing under the major-general commanding the district.

The patient states that when going at full gallop, his horse suddenly pulled up at a small nullah and he was thrown forward, his right thigh coming against the holster.

He felt "something give," but there was only slight pain. The evening of the same day he noticed a small tumour in right groin, but did not think much of it. The following day he again rode on parade for four hours. On the morning of 13th February he felt his leg cold and numb, and could scarcely move it. The following day being a holiday he rested, but as it did not improve he reported himself at hospital on the 5th February. No family history of heart disease.

*State on Admission.*—A well built muscular man of very dark complexion. About two and half inches below Poupart's ligament in right groin is an oval tumour about one and half inch long.

It is situated exactly in the course of femoral artery, and cannot be raised from it or moved to any extent. It pulsates forcibly, the pulsation being eccentric and expanding. Pulsation is immediately stopped by pressure on the artery above the tumour, and returns at once on removal of pressure. There is considerable pain in tumour extending into the popliteal space, and pain also is present along the course of the long saphenous nerve. No bruit

could be heard, but it was perhaps masked by the forcible knocking of the tumour against the stethoscope. Heart's sounds normal, pulse quiet, strong, natural.

Circumference of right thigh over tumour  $1\frac{1}{2}$  inches greater than circumference of left thigh.

In consultation with Surgeon Dorman, A.M.D., and Surgeon Blenkinsop, I.M.D., it was determined to apply digital pressure.

*Treatment.*—Six gunners were told off and instructed how to control the vessel as it passes over the brim of pelvis. Treatment was commenced at 8.15 o'clock a.m. on the 16th February 1877. At 11 o'clock a.m. one of the attendants was found not to be pressing over the seat of vessel, the consequence being that tumour was pulsating almost as forcibly as in the morning before treatment was commenced. At 12 o'clock noon he was a little restless and complained of the pain caused by pressure. He was ordered grs. 15 of chloral. At 4.50 o'clock p.m. pulsation had quite ceased in tumour, and there was no pain except that caused by pressure.

He also stated that he had a sensation in the leg from knee downwards as if it was about to burst. Slight pressure was kept up until 9 o'clock p.m.; when it was discontinued, no pulsation having returned. No pulsation could be felt in articular branches of popliteal artery.

On 23rd February the patient is doing very well, no pulsation has returned. The tumour is decreasing in size. Circumference of right thigh 20 inches, of left thigh 20 inches.

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## APPENDIX

## Annual Abstract of Meteorological Observations

## GIBRALTAR.

Lat. 36° 6' N.

Month.	Mean Pressure.	Air Temperature.										Tension of Vapour.	Relative Humidity.		
		Hourly Means.		Daily Means.		Means of.		Abs. Min.		Abs. Max.			Mean.	Minimum.	
		9 a.m.	9 p.m.	Simple.	Reduced.	Min.	Max.	Temp.	Day.	Temp.	Day.			Day.	
January -	30° 224	56° 9	—	—	—	52° 1	65° 6	46° 4	18th	70° 7	26th	410	86° 0	65° 0	26th
February	30° 217	55° 8	—	—	—	49° 9	67° 7	45° 5	25th	72° 2	15th	334	74° 0	63° 6	14th
March	30° 010	57° 8	—	—	—	51° 5	66° 9	46° 5	14th	76° 5	17th	394	81° 8	63° 2	10th
April	29° 963	63° 2	—	—	—	55° 9	71° 5	52° 0	9th	84° 0	23rd	464	79° 7	64° 0	1st
May	29° 967	66° 8	—	—	—	60° 5	75° 4	54° 3	8th	82° 3	25th	568	86° 0	71° 0	15th
June	30° 096	71° 7	—	—	—	65° 1	80° 4	60° 7	5th	88° 3	15th	532	74° 0	51° 0	2nd
July	30° 047	75° 5	—	—	—	69° 6	83° 1	65° 5	1st	92° 3	23rd	706	80° 0	63° 0	13th
August	30° 007	76° 3	—	—	—	69° 2	86° 5	63° 8	30th	90° 0	9th	722	80° 0	65° 0	31st
September	29° 972	73° 6	—	—	—	67° 7	80° 7	62° 0	11th	89° 5	17th	674	81° 0	60° 0	2nd
October	30° 112	68° 1	—	—	—	63° 0	73° 5	57° 0	8th	79° 8	19th	562	82° 0	62° 0	9th
November	30° 109	61° 4	—	—	—	56° 5	68° 4	49° 2	16th	74° 6	5th	446	81° 0	56° 0	20th
December	30° 188	55° 2	—	—	—	51° 4	61° 9	46° 0	26th	63° 8	9th	370	85° 0	72° 0	22nd
Mean	30° 072	65° 2	—	—	—	59° 4	73° 5	54° 1	—	80° 8	—	519	80° 9	63° 0	—

## MALTA.

Lat. 35° 53' N.

January -	30° 037	57° 4	—	—	—	51° 7	60° 6	46° 0	22nd	68° 0	6th	365	80° 8	56° 6 25th
February -	29° 996	56° 0	—	—	—	50° 9	59° 3	44° 0	1st	65° 0	18th	331	67° 5	57° 4 7th
March -	29° 938	57° 9	—	—	—	51° 4	62° 4	37° 8	3rd	73° 0	16th	325	66° 4	54° 0 18th
April -	29° 853	64° 1	—	—	—	57° 5	67° 7	51° 8	21st	78° 0	24th	412	60° 2	50° 2 23rd
May -	29° 967	68° 2	—	—	—	61° 3	71° 2	57° 0	3rd	79° 0	15th	477	67° 5	43° 4 15th
June -	30° 043	77° 0	—	—	—	70° 0	81° 3	63° 0	1st	86° 8	23rd	629	67° 0	37° 4 16th
July -	30° 018	82° 2	—	—	—	75° 2	86° 5	71° 0	30th	100° 0	17th	687	61° 8	37° 4 17th
August -	29° 967	81° 8	—	—	—	75° 6	86° 7	71° 0	6th	92° 8	26th	784	74° 0	53° 6 16th
September -	29° 976	82° 2	—	—	—	75° 3	85° 7	68° 8	20th	95° 0	24th	728	65° 8	41° 2 24th
October -	30° 033	69° 5	—	—	—	63° 6	72° 2	66° 0	21st	80° 0	2nd	431	65° 6	57° 0 8th
November -	30° 005	64° 4	—	—	—	59° 1	67° 6	50° 8	22nd	73° 0	12th	423	53° 9	49° 4 3rd
December -	29° 961	58° 1	—	—	—	53° 7	60° 8	44° 6	21st	66° 0	2nd	358	72° 0	49° 0 29th
Mean -	29° 966	68° 2	—	—	—	62° 1	71° 9	56° 0	—	79° 6	—	500	66° 9	48° 9 —

## SCUTARI.

Lat. 41° N.

January -	30° 061	44° 5	—	—	—	40° 4	50° 2	29° 5	28th	62° 7	7th	250	85° 0	69° 0 7th
February -	29° 919	41° 9	—	—	—	37° 1	50° 3	26° 6	16th	58° 7	26th	227	85° 0	53° 4 19th
March -	29° 878	48° 9	—	—	—	41° 6	58° 2	28° 0	3rd	79° 4	23rd	280	73° 0	47° 4 23rd
April -	29° 787	55° 1	—	—	—	46° 2	65° 4	40° 0	30th	76° 4	19th	355	81° 7	66° 0 5th
May -	29° 855	61° 5	—	—	—	50° 8	73° 8	43° 7	4th	82° 0	13th	428	78° 0	60° 0 29th
June -	29° 966	70° 8	—	—	—	58° 2	80° 6	49° 5	18th	87° 6	10th	520	69° 4	54° 2 12th
July* -	—	—	—	—	—	—	—	—	—	—	—	—	—	—
August -	29° 902	76° 0	—	—	—	64° 7	87° 4	59° 2	16th	93° 6	22nd	634	70° 6	51° 4 10th
September -	29° 937	70° 9	—	—	—	60° 9	81° 9	51° 7	29th	96° 0	5th	548	69° 0	53° 0 5th
October -	29° 994	61° 4	—	—	—	54° 2	69° 6	45° 0	14th	81° 2	10th	440	79° 5	62° 2 14th
November -	30° 011	52° 4	—	—	—	46° 3	60° 7	38° 4	19th	66° 8	13th	328	82° 2	60° 4 22nd
December -	29° 996	45° 7	—	—	—	40° 7	52° 3	28° 0	31st	65° 2	1st	276	87° 1	68° 4 1st
Total -	29° 937	57° 2	—	—	—	49° 2	66° 4	40° 0	—	77° 2	—	388	78° 2	59° 1 —

\* Observations incomplete, owing to illness of custodian.

No. XI.

taken at Foreign Stations in the Year 1877.

Long. 5° 20' W. Height of Barometer Cistern above Sea, 53 feet.

Mean Amount of Cloud.	Rainfall.			Weather.								Wind.								
	Total.	Maximum.	Day.	Number of Days of								Number of Observations under each Point.								
				Rain.	Snow.	Hail.	Thunder Storm.	Fog.	Clear Sky.	Overcast.	Gales.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.
4.0	2.58	1.16	3rd	6	—	—	—	—	15.5	4.5	5	2.0	3.0	9.0	—	0.5	3.5	8.0	5.0	—
2.2	—	—	—	—	—	—	—	—	21.5	2.5	3	1.0	1.0	6.5	—	—	—	10.5	9.0	—
3.9	2.80	1.00	24th	9	—	2	2	—	17.0	8.0	2	0.5	4.5	6.0	—	1.5	2.0	10.0	7.0	—
5.4	2.58	0.78	12th	13	—	1	1	—	8.5	8.0	1	—	3.0	1.5	1.0	—	5.5	17.5	1.5	—
4.2	0.98	0.38	4th	6	—	—	2	—	13.5	5.5	—	1.0	4.5	9.0	0.5	0.5	2.0	11.5	2.0	—
3.4	2.05	1.40	26th	6	—	1	4	—	19.5	4.5	—	—	8.0	2.5	1.5	—	10.0	7.0	1.0	—
3.4	0.12	0.10	9th	2	—	—	—	1	17.0	5.5	—	—	6.5	9.5	1.5	—	10.0	2.5	0.5	0.5
2.6	0.12	0.12	24th	1	—	—	—	4	22.0	4.0	5	—	10.0	6.5	1.5	0.5	10.0	2.5	—	—
5.1	3.52	1.58	22nd	13	—	—	1	—	11.5	8.0	4	—	5.0	9.5	0.5	2.5	3.5	8.5	0.5	—
3.7	0.03	0.03	23rd	1	—	—	—	—	16.5	4.5	2	—	6.5	13.0	—	0.5	3.5	4.0	3.5	—
2.9	0.90	0.54	12th	4	—	—	1	—	19.0	4.0	2	.5	7.0	6.0	—	—	2.5	5.5	8.5	—
4.4	1.37	0.47	15th	7	—	—	—	—	14.5	7.5	1	.5	—	13.0	—	—	0.5	4.5	12.5	—
3.8	17.05	1.58	22nd Sept.	68	—	4	11	5	196.0	66.0	25	5.5	59.0	92.0	6.5	5.5	53.0	92.0	51.0	0.5

Long. 14° 30' E. Height of Barometer Cistern above Sea, 70 feet.

6.0	5.34	1.80	29th	13	—	—	—	—	2.0	14.5	—	4.5	1.0	1.0	3.5	—	9.5	1.0	10.5	—
7.0	1.89	0.42	1st	15	—	—	—	—	16.5	—	—	3.5	2.5	—	2.0	—	2.0	3.5	14.5	—
5.5	0.95	0.20	14th	10	—	2	—	—	5.0	12.0	—	1.0	1.5	—	4.5	0.5	8.0	3.5	12.0	—
5.0	0.23	0.12	21st	2	—	—	—	—	5.0	11.0	—	1.0	3.0	—	4.0	—	3.0	1.5	17.5	—
4.5	0.06	0.06	25th	1	—	—	—	—	4.0	8.0	—	1.0	7.0	—	7.0	—	0.5	2.5	12.0	—
3.0	—	—	—	—	—	—	—	—	16.0	4.0	—	—	16.0	0.5	3.5	—	0.5	1.0	8.5	—
1.5	—	—	—	—	—	—	—	—	19.5	1.0	—	0.5	9.0	1.0	5.0	0.5	5.5	0.5	9.0	—
1.5	—	—	—	—	—	—	—	—	23.0	0.5	—	4.0	10.0	1.0	3.0	—	—	—	13.0	—
4.0	2.21	0.93	30th	5	—	—	—	—	11.0	10.0	—	0.5	7.5	1.5	7.0	0.5	3.0	0.5	9.5	—
5.5	5.13	1.65	20th	12	—	—	—	—	—	8.5	—	2.5	8.0	—	3.0	—	1.0	1.5	15.0	—
5.0	3.30	1.30	14th	10	—	—	—	—	5.5	8.0	—	2.0	8.5	1.5	4.0	0.5	4.5	3.0	6.0	—
6.0	5.16	1.00	5th	18	—	—	—	—	0.5	10.5	—	1.5	3.5	—	4.5	0.5	1.0	8.0	12.0	—
4.5	24.27	1.80	29th Jan.	86	—	2	—	—	91.5	104.5	—	22.0	77.5	7.5	51.0	2.5	38.5	26.5	139.5	—

Long. 29° 3' E. Height of Barometer Cistern above Sea, 60 feet.

8.1	3.63	0.82	13th	18	4	2	—	—	2.5	20.5	—	3.0	15.0	3.5	2.0	3.5	3.0	—	—	0.5
7.1	3.06	0.64	23rd	17	6	3	—	—	6.0	16.0	1	4.0	7.5	2.0	0.5	4.5	5.5	2.0	—	2.0
5.6	2.89	0.37	24th	13	3	1	—	—	11.0	13.0	1	5.0	3.0	2.5	1.0	7.5	4.5	6.5	0.5	2.5
6.4	2.09	0.80	25th	15	—	1	2	1	7.5	15.0	—	4.5	8.5	0.5	0.5	5.0	5.5	1.0	—	0.5
5.3	3.43	1.17	9th	15	—	1	4	—	10.5	11.5	—	4.5	7.0	0.5	—	6.5	5.5	3.5	—	3.5
3.7	3.08	1.90	16th	6	—	—	1	1	17.0	6.5	—	4.5	17.5	—	—	2.5	4.5	—	0.5	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4.6	0.88	0.51	14th	7	—	—	4	—	13.5	8.5	—	4.5	15.5	2.5	0.5	4.0	3.5	—	—	0.5
4.6	4.16	1.26	18th	7	—	—	2	—	15.0	9.0	—	6.0	6.5	1.0	0.0	5.0	8.5	—	—	1.5
7.0	3.69	0.96	8th	20	—	—	3	—	6.0	19.0	—	3.0	14.0	5.5	0.5	3.0	2.5	—	—	2.5
6.8	7.00	2.56	3rd	14	—	—	—	—	7.0	17.5	1	5.0	11.0	1.0	2.5	3.0	1.5	1.5	1.0	3.5
8.0	3.44	0.46	8th	20	3	1	1	1	3.5	22.5	—	13.0	7.5	2.5	2.5	1.0	2.0	—	0.5	2.0
6.1	37.4	2.56	3rd Nov.	152	16	9	17	3	99.5	159.0	3	57.0	113.0	21.5	10.0	46.0	46.5	14.5	2.5	19.0

January, half day short; April, 2 days short; June, half day short; July, 31 days short; } Wind obs.  
September, 1 day short.

## Appendix

## Annual Abstract of Meteorological Observations

FORT NAPIER, NATAL.

Lat. 29° 3' S.

Month.	Mean Pressure.	Air Temperature.										Tension of Vapour.	Relative Humidity.		
		Hourly Means.		Daily Means.		Means of		Abs. Min.		Abs. Max.			Mean.	Min.	
		9 a.m.	9 p.m.	Simple.	Reduced.	Min.	Max.	Temp.	Day.	Temp.	Day.			Day.	
January .	29° 868	71° 5	—	—	—	60° 3	81° 6	49° 5	14th	100° 2	22nd	532	69° 0	41° 0	22nd
February	29° 839	73° 4	—	—	—	61° 9	85° 1	55° 5	4th	101° 6	3rd	546	66° 4	42° 0	25th
March .	29° 871	72° 0	—	—	—	60° 4	83° 6	55° 7	19th	92° 1	26th	547	69° 0	49° 8	28th
April .	29° 861	68° 9	—	—	—	56° 2	82° 0	39° 6	26th	96° 1	19th	435	60° 0	31° 0	24th
May .	29° 922	63° 9	—	—	—	51° 6	77° 7	39° 3	26th	92° 7	19th	328	55° 0	30° 0	14th
June .	30° 168	57° 0	—	—	—	43° 5	72° 9	33° 5	18th	88° 0	1st	270	58° 2	35° 0	1st
July .	30° 130	58° 4	—	—	—	45° 2	73° 5	36° 4	3rd	83° 0	27th	330	67° 4	47° 0	2nd
August*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
September	30° 019	66° 5	—	—	—	49° 5	77° 8	41° 0	30th	101° 4	9th	375	58° 5	32° 0	8th
October .	29° 935	68° 6	—	—	—	54° 9	79° 3	43° 1	1st	109° 0	18th	403	56° 4	26° 0	14th
November	29° 833	70° 7	—	—	—	57° 2	81° 3	47° 0	20th	101° 5	15th	436	57° 0	33° 0	26th
December	29° 815	73° 8	—	—	—	58° 2	83° 4	53° 8	23rd	100° 0	2nd	526	62° 0	29° 0	14th
Total	29° 933	67° 7	—	—	—	54° 4	79° 8	44° 9	—	97° 1	—	430	61° 7	36° 0	—

\* No return forwarded for August. Mean of 11 months only.

SIERRA LEONE.

Lat. 8° 29' N.

Month.	Mean Pressure.	9 a.m.	9 p.m.	Simple.	Reduced.	Min.	Max.	Temp.	Day.	Temp.	Day.	Tension of Vapour.	Mean.	Min.	Day.
January	29° 925	81° 9	—	—	—	69° 5	90° 3	67° 0	30th	95° 0	30th	887	80° 0	60° 0	29th
February	29° 893	84° 6	—	—	—	71° 5	91° 7	61° 0	8th	98° 0	1st	904	75° 6	64° 0	12th
March	29° 922	84° 8	—	—	—	72° 8	92° 5	69° 0	8th	95° 0	27th	900	74° 8	55° 0	22nd
April	29° 944	84° 5	—	—	—	76° 0	92° 0	72° 0	23rd	95° 0	1st	956	86° 5	65° 0	23rd
May	29° 954	84° 1	—	—	—	75° 2	92° 7	71° 0	11th	95° 0	5th	934	80° 0	64° 0	16th
June	29° 913	81° 1	—	—	—	74° 0	89° 6	69° 0	6th	94° 0	4th	960	91° 5	69° 0	18th
July	30° 000	81° 0	—	—	—	73° 9	88° 7	71° 0	11th	96° 0	1st	947	90° 0	76° 0	8th
August	30° 005	78° 5	—	—	—	70° 2	85° 8	70° 0	23rd	91° 0	31st	897	91° 5	67° 0	11th
September	29° 947	81° 0	—	—	—	73° 5	86° 7	70° 0	28th	93° 0	4th	897	85° 8	80° 0	8th
October	29° 941	80° 4	—	—	—	73° 3	87° 1	71° 0	10th	92° 0	26th	942	93° 0	75° 0	26th
November	29° 908	83° 4	—	—	—	74° 0	90° 1	70° 0	11th	94° 0	29th	1003	88° 0	76° 0	22nd
December	29° 910	83° 2	—	—	—	75° 1	90° 9	71° 0	16th	93° 0	9th	965	85° 0	76° 0	30th
Mean	29° 939	82° 4	—	—	—	73° 3	89° 8	68° 5	—	93° 7	—	933	85° 1	69° 0	—

BARBADOES.

Lat. 13° 4' N.

Month.	Mean Pressure.	9 a.m.	9 p.m.	Simple.	Reduced.	Min.	Max.	Temp.	Day.	Temp.	Day.	Tension of Vapour.	Mean.	Min.	Day.
January	30° 054	79° 7	—	—	—	72° 5	84° 7	70° 3	17th	88° 0	4th	712	72° 8	56° 0	24th
February	30° 064	81° 3	—	—	—	72° 4	85° 7	70° 0	6th	87° 5	23rd	673	64° 0	57° 0	20th
March	30° 053	81° 0	—	—	—	72° 7	85° 8	70° 0	14th	88° 0	9th	725	67° 2	60° 0	23rd
April	30° 042	83° 9	—	—	—	74° 9	88° 4	73° 0	4th	92° 0	23rd	906	68° 0	58° 5	13th
May	30° 015	83° 9	—	—	—	75° 7	88° 6	72° 5	5th	90° 0	2nd	786	73° 0	57° 0	27th
June	30° 038	81° 6	—	—	—	75° 4	86° 6	73° 0	8th	90° 0	2nd	790	73° 6	56° 5	20th
July	30° 028	82° 7	—	—	—	74° 4	86° 3	71° 0	28th	88° 0	31st	840	75° 2	65° 2	1st
August	30° 028	84° 4	—	—	—	75° 1	88° 0	74° 0	10th	90° 0	23rd	804	68° 0	62° 0	23rd
September	29° 970	83° 8	—	—	—	75° 5	88° 6	74° 0	4th	91° 0	1st	851	73° 0	68° 0	30th
October	29° 966	84° 2	—	—	—	75° 8	89° 0	74° 0	18th	91° 0	11th	853	72° 0	68° 0	26th
November	29° 952	83° 4	—	—	—	75° 0	88° 9	72° 5	10th	90° 0	28th	816	72° 0	61° 0	3rd
December	29° 974	81° 8	—	—	—	73° 8	87° 0	70° 0	12th	89° 0	1st	808	75° 0	65° 0	1st
Mean	30° 015	82° 6	—	—	—	74° 4	87° 3	71° 9	—	89° 5	—	785	71° 2	59° 9	—

## No. XI.—continued.

taken at Foreign Stations in the Year 1877.

Long. 30° 2' E. Height of Barometer Cistern above Sea, 2,200 feet.

Mean Amount of Cloud.	Rainfall.			Weather.									Wind.								
	Total.	Max.	Day.	Number of Days of									Number of Observations under each Point.								
				Rain.	Snow.	Hail.	Thunder Storm.	Fog.	Clear Sky.	Overcast.	Gales.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.	
6.8	5.74	1.70	24th	18	—	—	—	5	—	9.0	19.5	—	1.0	5.5	20.0	4.0	—	—	—	—	0.5
6.5	6.32	1.34	12th	18	—	—	—	9	—	8.5	18.0	—	—	5.5	15.5	2.0	0.5	0.5	2.5	1.0	0.5
4.6	2.56	0.50	1st	10	—	—	—	9	—	15.0	14.0	—	—	6.0	21.0	0.5	0.5	—	—	1.5	1.5
3.5	1.45	0.42	8th	8	—	—	—	5	—	19.0	10.0	—	0.5	3.5	22.0	1.5	1.0	0.5	—	1.0	—
4.9	0.74	0.62	2nd	2	—	—	—	5	—	15.5	13.0	—	—	3.0	17.0	6.0	—	1.0	1.5	2.5	—
2.3	0.00	0.00	—	—	—	—	—	—	—	22.0	6.0	—	0.5	6.5	10.5	8.0	2.0	0.0	1.0	1.5	—
1.6	0.58	0.15	29th	4	—	—	—	1	—	24.0	6.0	—	0.5	8.0	13.0	8.0	1.5	0.0	0.0	0.0	—
5.2	1.18	0.60	14th	9	—	—	—	3	—	13.0	18.0	—	1.0	3.0	15.0	5.0	2.0	0.5	1.0	2.5	0.0
6.5	5.91	1.78	26th	15	—	—	—	6	—	8.5	19.5	—	2.0	6.0	15.0	5.5	1.5	—	—	1.0	—
6.7	2.89	0.72	16th	14	—	—	—	10	—	8.0	19.0	—	1.5	8.5	15.0	4.0	—	—	—	1.0	—
6.6	3.13	1.20	3rd	12	—	—	—	9	—	8.5	19.5	—	0.5	6.0	18.5	2.5	0.5	—	0.5	1.5	1.0
5.0	30.50.	1.78	26th Oct.	110	—	—	—	56	—	151.0	160.5	1	7.5	61.5	182.5	47.0	9.5	2.5	6.5	13.5	3.5

Long. 13° 9' W. Height of Barometer Cistern above Sea, 224 feet.

3.6	0.97	0.97	18th	1	—	—	1	—	14.5	1.0	—	6.5	8.0	2.5	—	—	—	7.5	1.5	5.0
3.3	—	—	—	—	—	—	—	—	12.5	0.0	—	4.5	5.0	—	—	—	—	10.5	4.5	3.5
3.4	1.39	0.96	8th	4	—	—	1	—	22.5	0.0	—	23.0	—	1.0	—	—	—	1.0	6.0	—
3.1	—	—	—	—	—	—	—	—	21.5	0.0	1	15.0	1.0	—	—	—	—	5.0	9.0	—
3.9	11.42	4.65	24th	16	—	—	15	—	17.0	3.0	—	8.0	4.0	7.5	—	—	—	5.0	6.5	—
4.5	18.30	3.32	14th	25	—	—	8	—	8.0	2.5	—	3.0	1.0	11.5	0.5	0.5	7.5	1.5	4.5	—
4.2	31.64	6.92	11th	23	—	—	2	—	6.0	2.5	—	1.0	0.5	6.0	1.0	1.5	4.5	8.5	3.0	5.0
4.7	43.36	6.94	7th	26	—	—	2	—	3.5	7.0	—	1.5	—	—	—	—	3.5	21.0	1.0	4.0
4.4	35.21	5.73	12th	25	—	—	5	—	6.5	0.0	—	3.0	1.0	—	0.5	—	4.0	13.0	2.0	6.5
4.5	32.95	7.22	18th	24	—	—	9	—	5.0	0.0	—	1.0	0.5	6.5	—	—	2.0	12.0	0.5	8.5
3.2	4.92	1.40	15th	9	—	—	10	—	20.5	0.0	—	1.0	—	3.0	0.5	0.5	2.5	6.5	1.5	14.5
3.0	1.68	1.56	2nd	2	—	—	1	—	27.0	0.0	—	—	3.0	9.0	1.5	—	1.5	7.5	2.0	6.5
3.8	181.84	7.22	18th Oct.	155	—	—	54	—	164.5	16.0	1	67.5	24.0	47.0	4.0	2.0	18.5	105.0	39.0	53.0

Long. 59° 40' W. Height of Barometer Cistern above Sea, 30 feet.

5.8	3.85	0.80	8th	15	—	—	—	—	1.0	4.0	1	—	29.0	1.5	0.5	—	—	—	—	—
5.7	—	—	—	—	—	—	—	—	2.0	2.0	—	1.0	24.0	1.0	2.0	—	—	—	—	—
5.3	8.22	0.75	17th	10	—	—	—	—	5.0	3.5	—	1.0	29.5	0.5	—	—	—	—	—	—
4.0	0.10	0.10	2nd	1	—	—	—	—	14.5	1.0	—	—	24.5	5.5	—	—	—	—	—	—
4.2	4.20	1.22	2nd	12	—	—	—	—	9.5	1.5	—	—	28.0	5.0	—	—	—	—	—	—
5.2	11.71	3.60	22nd	14	—	—	—	—	6.5	4.5	—	—	28.5	1.5	—	—	—	—	—	—
4.0	7.20	1.50	4th	17	—	—	4	—	15.5	1.0	—	—	30.0	1.0	—	—	—	—	—	—
3.5	2.80	0.70	17th	8	—	—	—	—	16.0	0.5	—	—	30.5	—	—	—	—	—	0.5	—
3.7	8.98	3.70	4th	13	—	—	—	—	19.0	2.5	1	1.0	24.0	4.0	1.0	—	—	—	—	—
3.7	5.51	0.65	15th	12	—	—	—	—	18.0	2.0	—	0.5	24.0	6.5	—	—	—	—	—	—
3.3	7.38	2.05	9th	8	—	—	—	—	20.0	0.0	—	5.0	20.0	5.0	—	—	—	—	—	—
3.2	5.04	1.05	12th	7	—	—	—	—	21.0	0.0	—	9.0	12.0	10.0	—	—	—	—	—	—
4.3	55.99	3.70	4th Sept.	107	—	—	4	—	148.0	22.5	2	17.5	302.0	41.5	3.5	—	—	—	0.5	—

## Annual Abstract of Meteorological Observations

NEWCASTLE, JAMAICA.

Lat. 18° 62' N.

Month.	Mean Pressure.	Air Temperature.										Tension of Vapour.	Relative Humidity.		
		Hourly Means.		Daily Means.		Means of		Abs. Min.		Abs. Max.			Means.	Min.	
		9 a.m.	9 p.m.	Simple.	Reduced.	Min.	Max.	Temp.	Day.	Temp.	Day.			Day.	
January	30.165	68.3	—	—	—	56.1	77.2	50.0	29th	82.0	7th	.533	76.5	66.6	22nd
February	30.122	67.3	—	—	—	54.5	76.5	47.0	11th	83.0	23th	.490	73.0	45.6	3rd
March	30.082	67.6	—	—	—	55.8	77.5	53.0	13th	83.0	4th	.543	81.5	62.0	3rd
April	30.065	69.3	—	—	—	54.2	78.2	50.0	17th	85.0	14th	.570	79.5	67.0	12th
May	30.008	69.9	—	—	—	54.6	76.6	50.0	18th	83.0	12th	.581	78.0	59.8	10th
June	30.014	70.0	—	—	—	52.7	79.5	50.0	3rd	84.6	23rd	.548	74.0	55.0	24th
July	30.046	73.0	—	—	—	60.6	81.2	58.0	6th	85.0	12th	.612	74.0	56.0	22nd
August	30.058	74.4	—	—	—	61.3	82.4	58.4	25th	86.0	28th	.626	78.8	63.0	31st
September	30.015	74.3	—	—	—	61.3	82.2	57.8	6th	87.2	19th	.603	70.8	52.0	7th
October	30.044	73.0	—	—	—	60.9	83.4	58.4	8th	90.0	4th	.604	74.0	68.8	7th
November	30.003	69.5	—	—	—	—	80.6	—	—	86.0	24th	.563	78.0	66.0	25th
December	30.039	67.0	—	—	—	—	77.1	—	—	83.0	30th	.549	83.0	66.0	25th
Mean	30.064	70.3	—	—	—	57.2	79.5	53.3	—	84.8	—	.568	77.2	63.8	—

UP-PARK CAMP, JAMAICA.

Lat. 17° 59' N.

January	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
February	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
March	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
April	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
May	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
June	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
July	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
August	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
September	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
October	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
November	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
December	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mean for nine months only	29.918	85.3	—	—	—	69.6	—	64.5	—	—	—	.812	65.9	51.8	—

NASSAU, BAHAMAS.

Lat. 25° 5' N.

January	30.146	73.2	—	—	—	66.1	75.8	61.0	2nd	87.0	24th	.635	75.7	60.0	25th
February	30.089	71.6	—	—	—	63.9	78.3	54.8	20th	85.4	6th	.619	78.5	56.0	11th
March	30.099	74.1	—	—	—	65.9	80.3	58.8	27th	87.8	13th	.635	74.1	48.6	10th
April	30.055	75.7	—	—	—	66.7	82.8	60.6	3rd	90.2	20th	.561	63.0	49.0	3rd
May	29.983	77.4	—	—	—	70.8	84.6	62.2	3rd	96.0	24th	.691	73.4	43.0	3rd
June	30.071	82.8	—	—	—	74.8	91.2	71.0	5th	100.2	28th	.814	73.4	61.0	29th
July	30.044	83.8	—	—	—	75.3	89.3	68.5	1st	100.0	6th	.854	72.0	57.7	31st
August	30.013	86.3	—	—	—	76.0	89.6	72.5	2nd	98.0	23rd	.874	71.0	61.0	16th
September	29.952	85.9	—	—	—	76.3	91.6	73.2	9th	99.0	10th	.860	68.0	56.0	21st
October	29.986	82.7	—	—	—	75.3	87.2	71.0	22nd	95.0	1st	.832	71.7	55.8	6th
November	29.988	77.4	—	—	—	71.0	83.0	66.8	24th	99.2	8th	.688	73.6	55.0	25th
December	30.080	72.7	—	—	—	67.0	77.5	60.0	31st	85.0	6th	.543	65.4	49.2	22nd
Mean	30.042	78.5	—	—	—	70.8	84.3	64.5	—	93.5	—	.716	71.7	54.3	—

## No. XI.—continued.

taken at Foreign Stations in the Year 1877.

Long. 76° 42' W. Height of Barometer Cistern above Sea, 3,800 feet.

Mean Amount of Cloud.	Rainfall.			Weather.								Wind.									
	Total.	Max.	Day.	Number of Days of								Number of Observations under each Point.									
				Rain.	Snow.	Hail.	Thunder Storm.	Fog.	Clear Sky.	Overcast.	Gales.*	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.	
3.9	9.58	2.40	31st	14	—	—	—	—	17.5	4.5	—	—	—	12.5	7.5	—	—	0.5	—	10.5	
3.7	4.13	0.70	1st	13	—	—	—	—	16.0	4.0	—	—	—	6.0	6.0	1.0	—	—	—	15.0	
3.9	3.97	0.82	21st	10	—	—	—	—	17.0	4.5	—	0.5	0.5	14.5	1.0	0.5	—	0.5	—	13.5	
4.1	8.15	5.35	25th	11	—	—	—	—	12.0	5.0	—	—	—	2.5	14.5	7.0	—	1.0	—	5.0	
6.6	22.40	6.25	15th	23	—	—	6	—	3.5	15.5	—	—	—	4.0	11.0	7.5	—	0.5	—	8.0	
5.4	8.17	2.90	10th	13	—	—	1	—	7.0	7.5	—	—	—	3.5	11.0	6.5	—	1.0	0.5	7.5	
4.8	5.71	2.70	6th	11	—	—	3	—	12.0	6.0	1	—	—	18.0	6.0	0.5	1.5	0.5	—	4.5	
4.4	1.95	0.96	29th	7	—	—	2	—	12.0	5.5	—	—	—	7.0	14.5	—	—	0.5	—	9.0	
4.5	9.29	1.55	17th	14	—	—	4	—	13.0	6.0	—	—	—	6.5	16.5	1.0	—	—	—	6.0	
4.2	7.36	1.05	16th	15	—	—	2	—	14.5	5.0	—	—	—	4.0	20.0	1.0	—	—	—	6.0	
5.5	14.13	4.45	12th	14	—	—	—	—	15.0	10.0	—	—	—	2.0	19.0	1.0	1.0	1.0	—	6.0	
6.2	31.68	6.35	11th	17	—	—	3	—	10.5	13.5	2	—	—	0.5	17.5	6.5	1.0	2.0	—	3.5	
4.8	126.52	6.35	17th Dec.	162	—	—	21	—	150.0	87.0	3	0.5	10.5	107.5	129.0	11.5	4.5	7.0	—	94.5	

\* No anemometer.

Long. 76° 56' W. Height of Barometer Cistern above Sea, 235 feet.

No observations taken.																					
5.0	1.30	0.52	25th	6	—	—	—	—	1.0	0.5	—	3.0	2.5	20.0	0.5	—	—	—	—	—	4.0
7.5	29.12	5.55	21st	14	—	—	12	—	—	15.0	—	3.0	3.0	20.0	1.0	0.5	0.5	—	—	—	3.0
5.5	6.60	5.03	9th	6	—	—	9	—	3.0	4.5	—	0.5	3.5	19.0	4.9	1.5	—	0.5	—	—	1.0
5.5	1.37	0.37	15th	8	—	—	7	—	2.5	3.0	—	0.5	1.5	22.5	4.5	0.5	—	—	—	—	1.5
4.0	0.30	0.22	28th	2	—	—	—	—	12.5	0.5	—	1.0	2.0	27.0	0.5	—	—	—	—	—	0.5
4.5	4.05	1.36	6th	7	—	—	16	—	7.0	1.5	—	3.5	7.0	12.5	6.0	0.5	0.5	—	—	—	—
4.5	0.45	0.28	19th	2	—	—	6	—	7.0	—	—	—	4.0	17.5	9.5	—	—	—	—	—	—
5.0	10.39	3.31	11th	10	—	—	2	—	7.5	5.5	—	—	6.0	7.0	15.0	—	0.5	—	—	—	1.5
4.5	2.51	0.62	10th	6	—	—	2	—	8.0	3.5	—	0.5	17.0	5.0	7.5	0.5	—	—	—	—	0.5
5.1	56.09	5.55	21st May	61	—	—	60	—	48.5	34.0	—	12.0	46.5	150.5	48.5	3.5	1.5	0.5	—	—	12.0

Long. 77° 21' W. Height of Barometer Cistern above Sea, 44 feet.

4.0	1.42	0.29	9th	12	—	—	—	2	13.5	1.5	1	3.5	15.5	1.5	4.0	0.5	—	0.5	5.5	—
6.0	1.33	0.30	16th	12	—	—	—	1	1.5	10.0	1	2.0	7.0	3.5	3.0	0.5	2.0	1.5	7.5	1.0
5.0	2.23	1.77	21st	10	—	—	1	—	6.0	8.0	—	3.5	12.0	1.0	5.5	0.0	3.5	1.5	4.0	0.0
5.5	4.03	1.72	22nd	6	—	—	—	—	4.5	7.0	—	4.0	8.5	2.0	9.0	1.5	2.5	0.5	2.0	0.0
7.1	5.61	1.52	28th	16	—	—	1	—	1.5	16.5	2	3.5	15.5	1.5	6.0	0.0	1.5	0.5	2.5	0.0
5.5	7.70	4.00	30th	12	—	—	4	—	2.0	5.5	—	2.5	14.5	6.0	4.5	—	0.5	1.0	1.0	0.0
7.0	6.32	1.13	12th	15	—	—	5	—	—	17.0	—	1.5	10.5	6.5	8.0	—	2.5	1.5	0.5	0.0
7.5	8.28	2.16	9th	17	—	—	7	—	—	17.5	—	—	8.5	4.5	11.0	2.0	2.5	—	2.5	0.0
6.0	4.88	2.35	9th	10	—	—	1	—	1.5	6.5	—	2.0	14.0	4.0	4.0	—	2.5	1.0	2.5	0.0
6.5	4.67	1.50	8th	14	—	—	1	—	3.0	11.5	1	0.5	20.5	0.5	1.5	1.0	3.5	1.0	2.5	0.0
7.0	5.51	1.80	9th	15	—	—	—	—	1.5	17.0	1	2.0	14.0	2.0	3.5	1.5	1.0	0.5	6.5	0.0
6.5	2.05	1.15	28th	10	—	—	—	—	3.5	13.0	1	1.0	18.5	2.0	3.0	1.5	1.5	1.5	2.5	0.0
6.1	54.03	4.00	30th June	149	—	—	21	3	38.5	131.0	7	26.0	159.0	35.0	63.0	7.5	23.5	10.5	39.5	1.0

F 690.

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## Appendix

## Annual Abstract of Meteorological Observations

BERMUDA.

Lat. 32° 17' N.

Month.	Mean Pressure.	Air Temperature.										Tension of Vapour.	Relative Humidity.		
		Hourly Means.		Daily Mean.		Means of		Abs. Min.		Abs. Max.			Mean.	Min.	
		9 a.m.	9 p.m.	Simple.	Reduced.	Min.	Max.	Temp.	Day.	Temp.	Day.			Day.	
January . . .	30° 218	66° 1	—	—	—	59° 9	70° 2	50° 4	28th	78° 9	21st	.490	75° 1	57° 2	25th
February . . .	30° 007	62° 2	—	—	—	54° 5	66° 3	40° 0	18th	72° 3	13th	.411	72° 0	56° 0	12th
March . . .	30° 112	64° 4	—	—	—	56° 8	68° 3	43° 2	12th	75° 3	24th	.424	68° 4	56° 4	1st
April . . .	29° 987	66° 2	—	—	—	57° 4	70° 7	51° 9	3rd	76° 9	30th	.462	70° 7	55° 0	16th
May . . .	30° 023	68° 9	—	—	—	61° 7	73° 0	53° 6	3rd	79° 3	22nd	.523	72° 8	54° 8	5th
June . . .	30° 168	77° 4	—	—	—	69° 9	81° 6	62° 4	5th	87° 6	22nd	.750	79° 8	67° 0	14th
July . . .	30° 110	80° 9	—	—	—	73° 1	85° 2	66° 5	15th	88° 3	30th	.800	76° 0	62° 8	26th
August . . .	30° 070	88° 1	—	—	—	74° 3	86° 4	71° 2	7th	90° 3	21st	.843	76° 0	63° 0	24th
September . . .	30° 046	90° 7	—	—	—	72° 9	84° 5	66° 8	30th	89° 7	9th	.914	88° 0	75° 0	18th
October . . .	30° 042	75° 1	—	—	—	67° 3	78° 4	60° 2	30th	85° 5	5th	*	*	*	*
November . . .	30° 135	69° 8	—	—	—	64° 8	74° 2	59° 6	23rd	81° 9	6th	.518	68° 0	46° 0	23rd
December . . .	30° 125	62° 8	—	—	—	57° 2	67° 5	52° 8	16th	73° 1	28th	.389	67° 0	49° 0	13th
. Mean . . .	30° 085	71° 5	—	—	—	64° 1	75° 6	56° 5	—	81° 4	—	.592	74° 0	58° 6	—

SINGAPORE.

Lat. 1° 16' N.

January	29.371	79.5	—	—	—	69.4	—	68.0	8th	—	—	.882	88.0	78.0	11th
February	29.358	78.9	—	—	—	68.7	—	67.6	19th	—	—	.870	87.5	83.0	18th
March	29.339	80.7	—	—	—	69.0	—	67.0	9th	—	—	.902	86.5	79.8	27th
April	29.316	83.1	—	—	—	70.8	—	69.0	1st	—	—	.956	85.0	78.6	30th
May	29.313	84.0	—	—	—	72.0	—	66.8	31st	—	—	.990	85.0	80.1	15th
June	29.349	81.5	—	—	—	70.9	89.3	67.2	16th	93.6	6th	.862	83.5	78.0	2nd
July	29.332	82.0	—	—	—	71.1	90.4	68.0	21st	96.4	28th	.926	85.0	75.8	23rd
August	29.354	84.4	—	—	—	72.9	93.6	69.0	31st	95.2	20th	.947	79.9	75.0	9th
September	29.324	84.1	—	—	—	71.4	89.9	68.5	14th	96.4	27th	.938	86.2	74.6	14th
October	29.352	86.2	—	—	—	71.4	94.5	69.2	27th	97.6	21st	1.064	85.1	77.8	21st
November	29.353	85.6	—	—	—	70.2	94.5	69.0	1st	96.6	21st	1.015	82.6	76.0	15th
December	29.294	85.0	—	—	—	69.7	93.1	68.0	7th	96.8	31st	.976	80.0	77.0	2nd
Mean	29.338	82.9	—	—	—	70.6	92.2	68.1	—	95.0	—	.946	84.5	77.8	—

HONG KONG, CHINA.

Lat. 22° 16' N.

January	30.218	61.3	—	—	—	57.3	68.2	50.5	7th	77.2	20th	.463	85.3	74.0	13th
February	30.161	58.1	—	—	—	54.7	63.0	42.9	19th	74.5	6th	.430	88.2	72.8	26th
March	30.086	63.4	—	—	—	58.5	69.0	50.1	5th	78.0	20th	.473	86.4	60.3	5th
April	29.998	71.0	—	—	—	67.3	75.6	61.1	19th	84.8	13th	.686	90.4	84.0	30th
May	29.822	78.8	—	—	—	74.2	83.7	70.2	5th	91.0	31st	.901	90.5	87.0	15th
June	29.807	84.5	—	—	—	77.7	90.7	73.0	2nd	96.3	27th	.931	78.0	58.0	25th
July	29.726	83.6	—	—	—	78.4	91.4	75.0	6th	97.2	4th	.899	78.0	60.6	4th
August	29.739	84.5	—	—	—	79.3	92.0	76.4	21st	98.5	7th	.912	76.4	59.0	7th
September	29.912	82.1	—	—	—	77.0	89.2	73.6	26th	95.2	20th	.845	77.5	65.6	18th
October	30.047	77.1	—	—	—	71.8	83.2	61.9	26th	90.0	10th	.619	87.0	48.0	27th
November	30.110	72.6	—	—	—	68.7	77.7	59.0	28th	86.2	10th	.664	82.0	70.0	5th
December	30.093	65.4	—	—	—	61.7	70.3	49.0	22nd	78.8	13th	.572	88.0	73.0	25th
Mean	29.977	73.5	—	—	—	68.9	79.5	61.9	—	87.3	—	.699	82.3	67.7	—

\* October; wet bulb thermometer out of order at Bermuda.

No. XI.—continued.

taken at Foreign Stations in the Year 1877.

Long. 64° 47' W. Height of Barometer Cistern above Sea, 151 feet.

Mean Amount of Cloud.	Rainfall.			Weather.									Winds.								
	Total.	Max.	Day.	Number of Days of									Number of Observations under each Point.								
				Rain.	Snow.	Hail.	Thunder Storm.	Fog.	Clear Sky.	Overcast.	Gales.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calms.	
4.5	2.46	0.60	24th	18	—	—	—	—	—	11.5	8.0	1	5	2	1	1	10	6	3	2	
6.0	10.14	2.78	17th	19	—	1	3	—	—	4.0	10.0	2	4	6	2	2	5	4	4	3	1
5.7	6.28	2.30	23rd	14	—	—	—	—	—	8.5	12.5	2	4	4	2	5	4	7	4	2	—
5.6	2.15	1.68	15th	8	—	—	—	—	—	9.5	10.5	3	4	5	3	—	9	9	5	1	
5.5	7.67	2.94	29th	12	—	—	1	—	—	9.5	15.0	1	5	3	1	1	10	2	5	3	
6.0	6.76	3.66	24th	13	—	—	1	—	—	7.5	10.0	—	—	1	3	5	6	7	1	5	
4.8	4.46	1.22	6th	18	—	—	1	—	—	9.5	6.5	—	2	1	1	6	1	8	4	3	5
5.7	9.19	2.30	3rd	20	—	—	1	—	—	6.5	7.5	—	2	2	2	1	6	13	2	1	1
5.0	4.52	2.46	29th	12	—	—	2	—	—	13.5	7.5	—	3	6	2	6	1	7	—	1	4
6.7	1.97	0.43	2nd	16	—	—	—	—	—	7.5	15.0	—	9	6	2	2	1	4	2	1	4
6.3	7.11	2.95	17th	13	—	—	—	—	—	6.5	12.5	1	3	6	3	8	2	3	2	3	—
6.5	3.23	0.57	30th	17	—	—	1	—	—	6.0	15.5	1	8	6	1	1	2	3	4	4	2
5.7	65.84	3.66	24th June	180	—	1	10	—	—	100.0	130.5	11	49	45	20	38	22	85	46	32	28

Long. 105° 31' E. Height of Barometer Cistern above Sea, 116 feet.

3.6	1.48	0.95	24th	5	—	—	4	—	15.0	—	—	—	31	—	—	—	—	—	—	—
3.8	7.41	1.58	19th	11	—	—	2	—	12.5	0.5	—	—	28	—	—	—	—	—	—	—
3.7	2.07	0.74	16th	9	—	—	4	—	14.0	—	—	—	31	—	—	—	—	—	—	—
3.5	1.54	0.63	21st	5	—	—	1	—	15.5	—	—	—	—	—	—	—	30	—	—	—
3.5	4.39	1.86	31st	9	—	—	3	—	12.0	0.5	—	—	—	—	—	—	31	—	—	—
4.5	8.92	1.65	16th	17	—	—	6	—	6.0	1.5	—	—	—	—	—	—	30	—	—	—
4.5	7.28	1.12	21st	16	—	—	3	—	9.0	3.0	—	—	—	—	—	—	31	—	—	—
4.0	3.69	1.14	29th	11	—	—	5	—	17.0	1.5	—	—	31	—	—	—	—	—	—	—
3.5	3.84	1.85	22nd	7	—	—	3	—	13.0	1.0	—	—	30	—	—	—	—	—	—	—
4.0	1.41	0.78	27th	7	—	—	8	—	8.5	0.0	—	—	31	—	—	—	—	—	—	—
4.0	4.00	0.56	30th	15	—	—	9	—	8.5	0.5	—	—	30	—	—	—	—	—	—	—
4.0	4.36	1.06	6th	17	—	—	1	—	11.5	1.5	—	—	31	—	—	—	—	—	—	—
3.9	50.9	1.86	31st May	129	—	—	40	—	142.5	10.0	—	—	243	—	—	—	122	—	—	—

Long. 114° 9' E. Height of Barometer Cistern above Sea, 43 feet.

4.2	0.02	0.02	28th	1	—	—	—	—	16.0	10.0	—	1.0	15.5	9.0	1.5	—	—	1.5	1.0	1.5
8.0	1.85	0.55	13th	10	—	—	—	1	5.0	21.5	—	8.5	6.0	11.0	3.0	—	1.0	0.5	2.0	1.0
7.7	1.10	0.55	26th	5	—	—	—	—	5.5	21.0	—	0.5	11.5	10.5	0.5	—	0.5	2.0	1.0	4.5
8.4	11.96	4.34	21st	11	—	—	6	—	2.0	22.5	—	1.0	14.0	4.0	1.0	1.5	2.5	—	0.5	5.5
8.1	5.75	1.09	12th	1	—	—	3	—	1.5	20.5	1	2.0	11.5	5.0	7.5	—	1.5	0.5	0.5	2.5
5.6	10.36	7.42	17th	12	—	—	1	—	9.5	9.5	—	1.5	8.5	4.5	8.0	6.5	2.5	1.5	0.0	7.0
7.0	14.56	2.15	1st	23	—	—	5	—	6.5	16.5	—	—	2.5	5.5	4.0	3.0	4.0	4.0	0.5	2.0
5.5	14.82	3.42	9th	14	—	—	1	—	11.0	11.5	—	—	0.5	9.0	1.5	1.0	5.5	3.5	—	10.0
6.3	14.24	4.75	3rd	11	—	—	1	—	7.0	13.0	3	—	2.0	6.0	4.5	4.5	4.0	—	0.5	8.5
4.8	1.62	1.25	6th	4	—	—	—	—	14.5	11.0	—	1.0	8.5	16.5	2.5	—	—	—	—	2.5
6.2	0.73	0.23	27th	5	—	—	—	—	8.5	13.0	—	—	6.5	17.5	—	—	1.0	0.5	4.5	—
8.4	1.47	0.36	6th	9	—	—	—	—	1.0	22.0	—	0.0	3.0	13.5	1.5	—	—	3.5	—	9.5
6.7	78.38	7.42	17th June	115	—	—	17	1	88.0	192.0	4	10.5	85.0	112.0	35.5	16.5	21.5	18.0	6.5	59.5

\* No daily record of observations kept; eight months returned as N.E. Monsoon; four months returned as S.W. Monsoon at Singapore.

## Appendix

## Summary of Results of Meteorological Observations

Stations, with their Height above the sea.	Mean Pressure.	Air Temperature.								Tension of Vapour.	Relative Humidity.		
		Hourly Means.	Means of		Abs. Min.		Abs. Max.		Mean.		Min.		
			9 a.m.	Min.	Max.	Temp.	Day.	Temp.			Day.	Day.	
ft.													
Mediterranean:													
Gibraltar - - - 53	30.072	65.2	59.4	73.5	45.5	25 Feb.	92.3	23 July	.519	80.9	51.0	2 June	
Malta - - - 70	29.966	68.2	62.1	71.9	37.8	3 Mar.	100.0	17 July	.500	66.9	37.4	16 June	
Scutari* - - - 60	29.937	57.2	49.2	66.4	26.6	16 Feb.	96.0	5 Sept.	.388	78.2	47.4	23 Mar.	
African:													
Natal (Fort Napier)† 2,200	29.932	67.7	54.4	79.8	33.5	18 June	109.0	18 Oct.	.430	61.7	26.0	14 Oct.	
Sierra Leone - - 224	29.939	82.4	73.3	89.8	61.0	8 Feb.	98.0	1 Feb.	.933	85.1	55.0	22 Mar.	
America & W. Indian:													
Barbadoes - - - 30	30.015	82.6	74.4	87.3	70.0	12 Dec.	92.0	23 April	.785	71.2	56.0	24 Jan.	
Newcastle, Jamaica‡ 3,900	30.054	70.3	57.2	79.5	47.0	11 Feb.	90.0	4 Oct.	.568	77.2	45.6	3 Feb.	
Up-Park Camp, } Jamaica§ - }	29.918	85.3	69.6	—	60.0	22 Oct.	—	—	.812	65.9	46.0	12 May	
Nassau, Bahamas - 44	30.042	78.5	70.8	84.3	54.8	20 Feb.	100.2	23 June	.716	71.6	43.0	3 May	
Bermuda - - - 151	30.085	71.5	64.1	75.6	40.0	18 Feb.	90.3	21 Aug.	.592	74.0	48.0	23 Nov.	
Singapore - - - 110	29.338	82.9	70.6	92.2	66.8	31 May	98.6	21 Nov.	.946	84.5	74.6	14 Sept.	
Hong Kong - - - 43	29.977	73.5	68.9	79.5	42.9	19 Feb.	98.5	7 Aug.	.699	82.3	48.0	27 Oct.	

\* Scutari. Mean of 11 months only. No observations taken in July. Observations on wind 35 days short.

† Port Napier, Natal. Mean of 11 months only. No observations forwarded for August.

‡ Newcastle, Jamaica, no anemometer on the station.

No. XI.—continued.

taken at Foreign Stations in the Year 1877.

Mean amount of Cloud.	Rainfall.			Weather.								Wind.								Latitude.	Longitude.		
	Total.	Max.	Day.	Number of days of								No. of Observations under each point.											
				Rain.	Snow.	Hail.	Thunder-storm.	Fog.	Clear sky.	Overcast.	Gales.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.			Calms.	
3.8	17.05	1.58	22 Sept.	68	—	4	11	5	196.0	66.0	25	5.5	59.0	92.0	6.5	5.5	53.0	92.0	51.0	0.5	36	6 N.	5 20 W.
4.5	24.27	1.80	29 Jan.	86	—	2	—	—	91.5	104.5	—	22.0	77.5	7.5	51.0	2.5	38.5	26.5	139.5	0.0	35	53 N.	14 30 E.
6.1	37.40	2.56	3 Nov.	152	16	9	17	3	99.5	159.0	3	57.0	113.0	21.5	10.0	46.0	46.5	14.5	2.5	19.0	41	0 N.	29 3 E.
5.0	30.50	1.78	26 Oct.	110	—	—	56	—	151.0	160.5	1	7.5	61.5	182.5	47.0	9.5	2.5	6.5	13.5	3.5	29	3 S.	30 2 E.
3.8	181.84	7.22	18 Oct.	155	—	—	54	—	164.5	16.0	1	67.5	24.0	47.0	4.0	2.0	18.5	105.0	39.0	58.0	8	29 N.	13 9 W.
4.3	55.99	3.70	4 Sept.	107	—	—	4	—	148.0	22.5	2	17.5	302.0	41.5	3.5	—	—	—	0.5	—	13	4 N.	59 40 W.
4.8	126.52	6.35	11 Dec.	162	—	—	21	—	150.0	87.0	13	0.5	10.5	107.5	129.0	11.5	4.5	7.0	—	94.5	18	62 N.	76 42 W.
5.1	56.09	5.55	21 May	61	—	—	60	—	48.5	34.0	—	12.0	46.5	150.5	48.5	3.5	1.5	0.5	—	12.0	17	59 N.	76 56 W.
6.1	54.03	4.00	30 June	149	—	—	21	3	38.5	131.0	7	26.0	159.0	35.0	63.0	7.5	23.5	10.5	39.5	1.0	25	5 N.	77 21 W.
5.7	65.34	3.66	24 June	180	—	1	10	—	100.0	130.5	11	49.0	45.0	20.0	38.0	22.0	85.0	46.0	32.0	23.0	32	17 N.	64 47 W.
3.9	50.9	1.86	31 May	129	—	—	49	—	142.5	10.0	—	—	243.0	—	—	—	122.0	—	—	—	1	16 N.	105 31 E.
6.1	78.38	7.42	17 June	115	—	—	17	1	88.0	192.0	4	10.5	85.0	112.0	35.5	16.5	21.5	18.0	6.5	59.5	22	16 N.	114 9 E.

§ Up-Park, Jamaica. Mean of nine months only. No observations taken in January, February, or March.  
 ¶ Singapore. Maximum temperature recorded for seven months only. No daily record kept of observations on wind except monsoon change.

## APPENDIX No. XII.

## THE ALEXANDER MEMORIAL FUND.

## COMMITTEE.

Sir WILLIAM M. MUIR, K.C.B., M.D., Hon. Physician to the Queen,  
Director-General, *President*.

Sir T. GALBRAITH LOGAN, K.C.B., M.D., Hon. Physician to the Queen.

Surgeon-General T. G. BALFOUR, M.D., F.R.S.

Surgeon-General T. LONGMORE, C.B., Hon. Surgeon to the Queen, Professor  
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Deputy Surgeon-General J. A. BOSTOCK, C.B., M.D., Hon. Surgeon to the  
Queen.

Deputy Surgeon-General W. J. FYFFE, M.D.

Surgeon-Major F. S. B. F. DE CHAUMONT, Professor of Military Hygiene.

R. LAWSON, Esq., M.D., Inspector-General of Hospitals.

Surgeon-General W. RUTHERFORD, C.B., M.D.

Surgeon-General W. MUNRO, C.B., M.D.

Deputy Surgeon-General Sir ANTHONY D. HOME, K.C.B., V.C.

Surgeon-Major FREDERICK ROBINSON, M.D., Scots Guards.

At a meeting of the Committee, held on the 8th of April 1876, at the Office of the Army Medical Department, 6, Whitehall Yard, it was determined that the Alexander Memorial Prize of 50*l.*, and a Gold Medal of the value of 10*l.*, be offered for the best Essay—

“On the influence of drinking water in originating or propagating enteric fever, diarrhoea, dysentery, and \* cholera: to be illustrated, as far as possible by instances which have come under the personal observation of the author.”

The Essay to be legibly and clearly written, superscribed with a brief motto, and accompanied by a sealed envelope similarly superscribed, containing the name and address of the author.

Essays to be despatched to the President, Alexander Memorial Fund Committee, on or before the 31st December 1878.

The competition to be limited to Executive Medical Officers of the Army on full-pay.

The relative merits of the Essays to be determined by Assessors selected by the Committee.

The Prize to be awarded to the writer of the best Essay offered, without reference to the number of competitors, provided the writer has complied with the prescribed conditions.

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\* Not or cholera, as was previously announced.



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